ANALYSIS OF OFF-AXIS ENHANCDED DYNAMIC WEDGE

DOSIMETRY USING A 2D DIODE ARRAY

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The examination of the dosimetry of Varian's enhanced dynamic wedge along the gradient direction of the wedge and the quantification of off-axis enhanced-dynamic-wedge factors (OA-EDWF) was studied. The convolution algorithm implemented by the treatment planning system, will over estimate the enhanced-dynamic-wedge (EDW) factors for points further away from the central axis of the wedged beam. This overestimation will result in an inaccurate dose administered to the patient. Quantification of the OA-EDWF's were then measured by a 2D-didoe array at 5 cm, 10 cm, 15 cm, and 20 cm using water phantoms. Wedge angles of 15°, 25°, 30°, 45°, and 60° were examined at each depth using the 21iX with incident photon energies of 6 MV and 18 MV.

Using these measured results, an absolute wedge factor was then applied by the aid of a Farmer chamber measurement taken at the center of the field to determine the OA-EDWF. These results were then compared to the convolution algorithm results with the same setup parameters by calculating percent differences. These percent differences were greatest at the periphery of the wedged field where the penumbra of the wedge was present, making the last 2 cm of the EDW to be clinically unacceptable.

The clinically useful range then of the EDW is 26 cm, where the percent difference is in a tolerable range of within a few percent. It can be concluded that any dose calculation calculated by the TPS, involving an EDWF on the periphery of a wedged beam, must be subjected to scrutiny.

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CHAPTER 1

INTRODUCTION

The delivery of an enhanced-dynamic-wedge (EDW) is a simple one-dimensional intensity modulation, where only two parameters are modulated during the course of treatment: jaw position and beam intensity. When combined these modulations create a fluence profile in real time, which is similar to a physical wedge of a particular angle. Since photon dose calculations are time-independent, the dose calculations for EDW's require these modulations to also be independent of time.

In the Varian system used here a Ball Memorial Hospital (BMH), Segmented Treatment Tables (STT's) accomplish this need by specifying the relative cumulative dose delivered for various dynamic collimator positions. The STT's control the collimator positions (treatment segments) and also control the monitor units within each segment. STT's are unique to a particular energy, field size, and wedge angle.

The "Golden STT" (GSTT) is a combination of all allowable wedge field sizes and angles ≤ 60°. The GSTT then allows for any wedge angle less than 60° to be generated, though at this facility (BMH) only utilizes the 15°, 25°, 30°, 45°, and 60° wedge angles. The GSTT equation is as follows:

$$D_\theta = \frac{\tan 60° - \tan \theta}{\tan 60°} * D_0(0) + \frac{\tan \theta}{\tan 60°} * D_{60}(y) \qquad (1.1)$$

where $D_0(0)$ is the open field dose, without the presence of a wedge, $D_{60}(y)$ is the cumulative dose delivered at the dynamic collimator position "y" in the GSTT and θ is the wedge to be delivered. Note that the open field dose is held constant and is given the GSTT at central axis of the field. (See Appendix E for diagram of GSTT equation.) The GSTT equation allows for the wedge profile to be "flattened", thus giving the desired wedge angles of $\leq 60°$.

The final step in generating an STT for treatment is called the "truncation." The truncation is composed of two calculations: a creation of an evenly spaced segment STT throughout the field and a linearly interpolated cumulative dose using Eq. 1.1. The result is an STT for the specified field length and wedge angle, this modified STT is what is utilized in the dose calculation.

The modified STT specifies the relative cumulative dose delivered at various jaw positions, and since BMH uses the Varian system, the increase in cumulative dose delivered in the interval between two dynamic jaw positions are linear and follow Eq. 1.2:

$$D(y) = (D_b - D_a)\frac{y-a}{b-a} + D_a \tag{1.2}$$

where D(y) is the cumulative dose delivered at the jaw position (y), (a, b) are adjacent jaw positions from the STT, $a<y<b$, and D_a,D_b are the values of the jaw positions. This equation allows the calculation of the cumulative dose to any jaw position that is part of the EDW treatment. The formatting of the information creates information that is independent of time by converting the modified STT to a transmission matrix.

The transmission matrix utilizes the weight of dose of a single point compared to the total dose at the "fixed wedge position" -0.5 cm which is where the beam is always open. The transmission matrix is the used in dose calculation algorithms by the treatment planning software and dose calculations are then proceeded in the same manner as physical wedges.

The wedge factor (WF) calculations, involve another algorithm analogous to the wedge attention factor of a physical wedge. Using the STT's control of the modulations, a WF is the ratio of the monitor units delivered to a specified point divided by the total number of monitor units delivered to the entire field, where both are quantities found in the STT.

The WF must be corrected for scatter dose from the collimators; this is done after the primary WF is established. By comparing approximate WF's calculated for calibration setups to measured wedge factors for the same setup for a 60° EDW. The correction factor can then be obtained for any angle using the ratio of tangents formula, Eq. 1.3:

$$CF = (CF_{60} - 1)\frac{\tan\theta}{\tan 60} + 1 \qquad (1.3)$$

where θ is the angle to be delivered, CF is the correction factor, and CF_{60} is the correction factor of a 60° wedge. The correction factor is then used to correct the original approximated WF using the following Eq. 1.4:

$$WF = WF_{primary} * CF_{\theta} \qquad (1.4)$$

The result of the above equation in then utilized in the time/MU calculations within the treatment planning system.

One limitation of this approach utilized with the treatment planning system, is that the WF for points further away from the geometric center of the field will be overestimated. Scatter dose decreases with off-axis distance and this decrease is not modeled with this approach because the correction factor (CF) is calculated at the field's center. This overestimation is of course an unwanted occurrence, and hence deserves a study to be done.

It is the purpose of this paper to report and examine the off-axis enhanced-dynamic-wedge factors (OA-EDWF's) of points further away from and including the geometric center of treatment fields. All available angles will studied, all relevant energies, and pre-described depths to simulate a patient. A comparison study will then be conducted between CMS treatment planning software and actual dose measurements acquired throughout this study.

CHAPTER 2

DOSE DETECTION

In this study the accurate and precise measurements of the dose distributions delivered by the wedges is essential to justify the validity of the study. Since the fields are very large, the dose detection method must be capable of gathering multiple points of data throughout the field at the same time. With this in mind the following chapter will discuss the detection methods used to determine the off-axis-enhanced-dynamic-wedge factors (OA-EDWFs).

2.1 MapCHECK

The MapCHECK device is a 2-D diode array. The diode array was developed for use in intensity modulated radiation therapy (IMRT) quality assurance.[7,8] IMRT fields are by nature very small, and hence require a detector that will not be near the penumbra of the field. Since the active detector of the array is very small (0.64 mm^2), the MapCHECK is well suited to have a large number of diodes within these very small fields. In this study, however, the need for small field measurements is not needed, though with the amount of 445 diodes present, the 2-D array gives a number of single point measurements throughout the wedge travel.

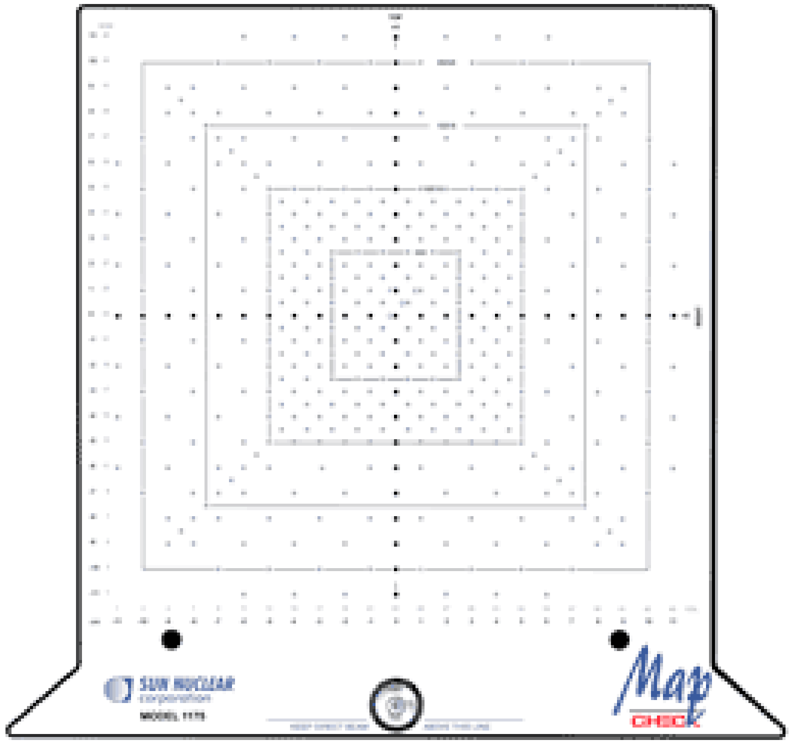

Figure 2.1: Beam's eye view of MapCHECK 2-D array.

The physical size of the MapCHECK, is 22 cm x 22 cm with 0.5 cm spacing between each detector along the vertical and horizontal axis relevant to this study. The array then establishes the perfect way to get multiple point measurements under the field at the same time.

2.2 MapCHECK vs. Film and Ion Chambers

Film has long since been a standard of dose detection. In this study film would work well as far as actual data measurements are concerned. Film is ideal for gathering multiple point measurements throughout the EDW motion, all at the same time, also working as an integrating dosimeter. Film's ancillary equipment issues, however, are the reasons why film was not chosen as the main dose detection method in this study.[1] The inherent errors arising from processor conditions, interfilm emulsion differences, and artifacts associated with air pockets makes film measurements less precise. With every field, a new piece of film would have to be used, which is very costly, and imparts a human error in changing out each film.

Relevant to this study, an ion chamber is impractical. Since multiple point measurements across a wedges' field are needed at the same time, the user would have to go into the treatment room for every point away from the center axis[2]; therefore, for one wedge angle at a particular energy would mean 22 times into the room. This is very troublesome, time consuming, and again creates a potential for error to be introduced within the study.

American Association of Physicists in Medicine (AAPM) Task Group-51 (TG-51) gives strict guidelines as to how the calibrations of linear accelerators are to be completed. Within the TG-51 guidelines, the absolute wedge profiles and angles are measured with ion chambers. This absolute dose measurement will then be adhered to during the study; therefore, all absolute dose measurements on the central axis of the beam will be taken with an ion chamber. Table 2.1 provides a summary of each detector's usefulness relevant to this study.

Advantages and Disadvantages of Each Detection Device			
	Film	**Ion Chamber**	**MapCHECK**
Ease		X	X
Time Factor		X	X
Small Fields			X
Large Fields			X
Relative Dose			X
Absolute Dose		X	
Reproducibility			X

Table 2.1: Summary of Different Dose Detection Methods

CHAPTER 3

EXPERIMENTAL PROCEDURES

The study was conducted using the Varian 21iX linear accelerator, with the photon energies of 6 MV and 18 MV. All energies were given 100 monitor units.[5] After the photon energies were chosen, based upon the clinical usefulness of the data, the relevancy of the study still needed to be greater. Therefore, to greater enhance validity of the study, patients or patient equivalent phantoms must be used.[3] Since this study used high ionizing radiation doses, water equivalent phantoms were the only choice to accurately simulate radiation interaction within a patient's body.

Figure 3.1: Solid Water phantoms used in study to simulate patient depth

With the experiment established at 100-cm source to detector distance, the solid water blocks were then used at four different depths: 5 cm, 10 cm, 15 cm, and 20 cm. Solid Water was incorporated due to the inherent dose attenuating qualities that make the plastic equivalent to water, and since patients are mainly water equivalent. The four depths were chosen based on clinical relevance. These depths are representative of the clinical depths used for calculations. Fields are not common beyond roughly 20 cm. A depth less than 5 cm is clinically irrelevant for use, due to the fact that a majority of wedged fields used in the clinic are always around 5 cm depth.

After determining the energy, phantom, and depth, the enhanced dynamic wedged field could then be delivered to the detector.[9] The gantry, couch, and collimator were all set and maintained at 180°. The physical size of the 2D-diode array allows for point measurements that are 11 cm away from the center diode relative to the center.

The actual size of the field is larger than this size, due to the need to capture all of the OA-EDWF's for all fields. If the field setup was established only to fit within the 2D array area, points that are further away from the center point of the field would be neglected. Using the Varian system, a 30-cm moving-wedge distance is the greatest wedge that can be traveled.

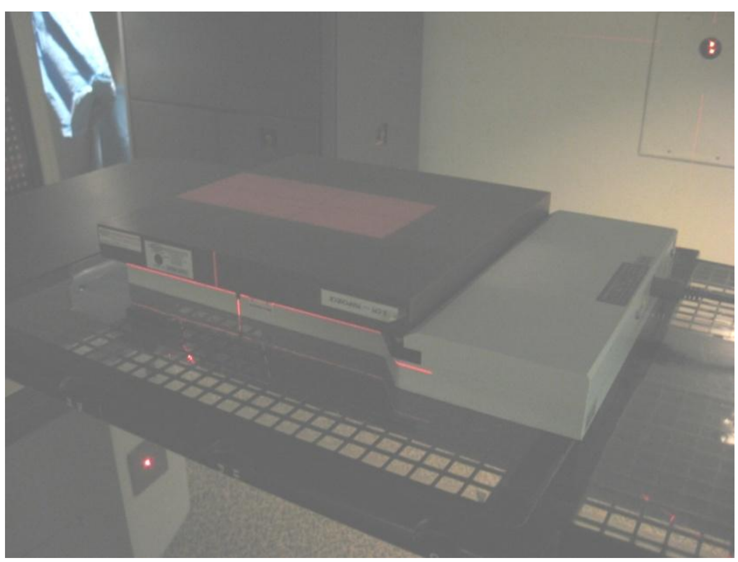

Figure 3.2: A picture showing the "low" field splitting relative to diode array.

Therefore to capture the entire OA-EDW movement the detector array must be shifted away from the center axis of the field, moving the detector closer to the beginning of the start of EDW.

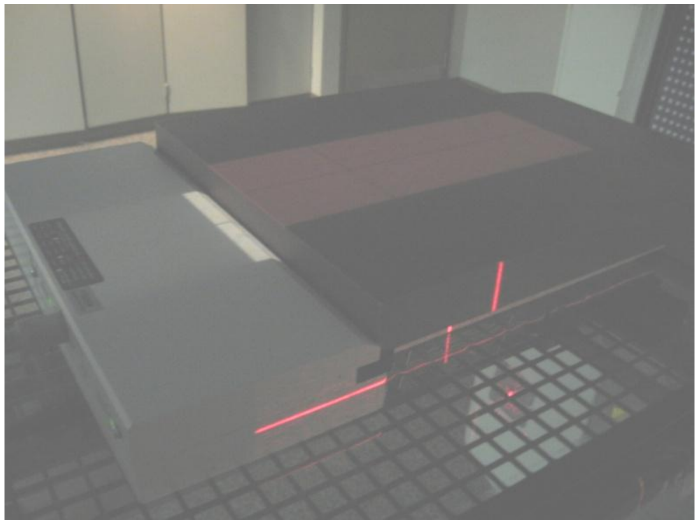

Figure 3.3: A picture of the "high" field position relative to the diode array.

Moving the detector however, will cause the bottom part of the wedge to be neglected. To counter act this, a second field of the exact EDW must be measured with the detector array shifted back to its original position, with the center of the 2D-diode array coinciding with the center of the field's axis.

The splitting of the field will then allow for the greatest distance away from the center axis of the field to be measured. Since the wedge factor is based on the ratio of the point measurement relative to the center axis point measurement, allowing the collected data to be the entire data set possible for an EDW using the Varian system.

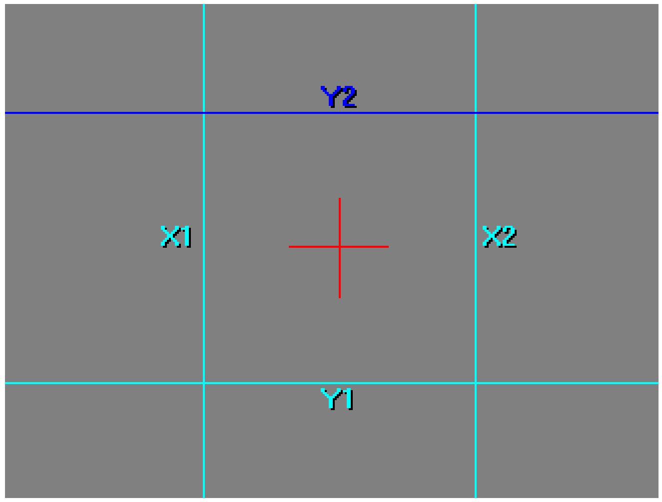

Figure 3.4: A view of the 2100iX collimator jaw designations.

The y-2 jaw as established as the moving collimator jaw.[6] This jaw's movement started 20 cm away from the center axis of the field. The y-2 jaw would then move toward y-1, based upon the movements prescribed by the STT's. The y-2 jaw's finished position was -9.5 cm away from the center axis, making the y-2 and y-1 jaws only 0.5 cm away from each other. The x-2 and x-1 jaws were kept at 10-cm distance away from the center axis of the field, making the overall field size in the x-direction 20 cm.

CHAPTER 4

EXPERIMENTAL RESULTS

The following chapter is a description of the criteria, methods and results of the off-axis enhanced-dynamic-wedge factors (OA-EDWF's) for the 21iX 6 MV and 18 MV energies developed for the 15°, 25°, 30°, 45°, and 60° enhanced-dynamic-wedge (EDW) angles.

4.1 Measured Results

The MapCHECK diode array device was utilized to acquire the dose at a given distance from the center axis of the beam. The EDW is setup to deliver 100 cGy to the central axis of the beam, which is the center diode on the MapCHECK. The diode array then collects the relative dose distributions of the EDW. Fig. 4.1 is a representation of the raw data acquired by the diode array.

-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0
						9.6499				10.1171				9.3746				8.2477
				60.6177				62.8642				61.7336				63.0965		61.1666
71.9055		74.1742				76.466				77.1677				75.7351				77.2273
	74.8225																	
75.4566		75.5234		77.8479				77.7248				76.9344				77.3844		80.3716
			76.3328															
		78.0247		77.7		79.5473				78.2234				80.1854				80.0272
					79.7655													
76.7509				79.6914		80.2198		79.1052				78.5842				79.4394		80.9296
							79.3113											
		79.648				80.8015		81.0186		81.1382		81.2892		81.4141		81.1235		81.1104
									81.4225		81.28		81.634		81.5567		81.7652	
77.9595				79.9233				81.5091		81.4549		81.7377		81.4829		81.2115		81.1601
									81.8236		82.0952		81.7918		81.5882		81.376	
		80.6007				81.6515		82.196		82.1423		82.1172		81.7523		81.6808		81.2353
									82.2641		82.0007		81.222		81.9051		81.8491	
78.9609				80.2193				81.2591		81.9865		82.3214		82.3928		82.3981		82.1763
									82.7055		82.5145		82.4573		82.3091		80.7637	
		81.5373				81.0481		82.6747		81.7021		82.0229		82.7678		82.5746		82.6384
									83.1814		83.3894		83.2558		83.106		82.8389	
80.4054		82.9637		82.1906		83.2588		83.6543		83.6367		83.4493		82.8944		83.8434		82.1523
									82.9482		83.9682		83.574		83.8838		82.8006	
		82.7296				83.1036		84.4431		84.5658		84.5337		84.2998		84.438		84.2551
									84.0939		84.6901		84.99		84.9155		84.1172	
82.2467				83.0238				85.5578		85.5245		85.5277		84.2829		85.5476		85.5845
									85.7548		85.1197		85.804		85.977		85.3791	
		83.7056				84.4096		86.4551		86.8856		86.3994		85.7353		86.3305		86.5737
									87.5422		86.2691		86.9576		86.7955		87.0774	
84.2261				84.8456				86.9773		87.9655		88.1492		87.862		86.4798		87.5613
									88.8538		88.6487		88.1587		88.6218		88.2927	
		87.4444				86.7402		88.3554		89.3803		89.3581		89.4491		88.072		88.8296
							89.6283											
86.7948				89.7383		90.46		90.6546				88.8946				89.8764		91.2082
					89.8964													
		90.3352		91.5243		91.8815				92.2778				90.0821				91.0351
			90.997															
89.968		92.5963		93.5506				94.0464				91.2592				92.5432		92.8756
	91.9636																	
92.0724		94.8087				95.9754				94.3012				94.4652				93.8836
				97.5224				97.9877				95.5582				96.0801		94.1453
						100				98.1037				98.6166				96.5546
-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	-10	-5	0

Fig. 4.1: The MapCHECK array. Diodes highlighted in red are those used to measure the EDWFs Shown is half the output file.

To determine the relative wedge factor (WF) of each field, the ratio of any off-axis point compared to the center diode position was calculated using Eq. 4.1,

$$WF = \frac{D_{OAD}}{D_0} \tag{4.1}$$

where D_{OAD} is the dose to any point along the wedge's axis of movement compared to D_0 which is the dose given to the center diode of the 2-D array. The "raw" relative MapCHECK data was then exported to Microsoft Excel to calculate the WF's of the relative fields. Since the fields were split, requiring the exposure of the same diode to be irradiated in both fields, this diode position was diode 7 of 23 starting from the bottom of the array, seen below in Fig. 4.2.

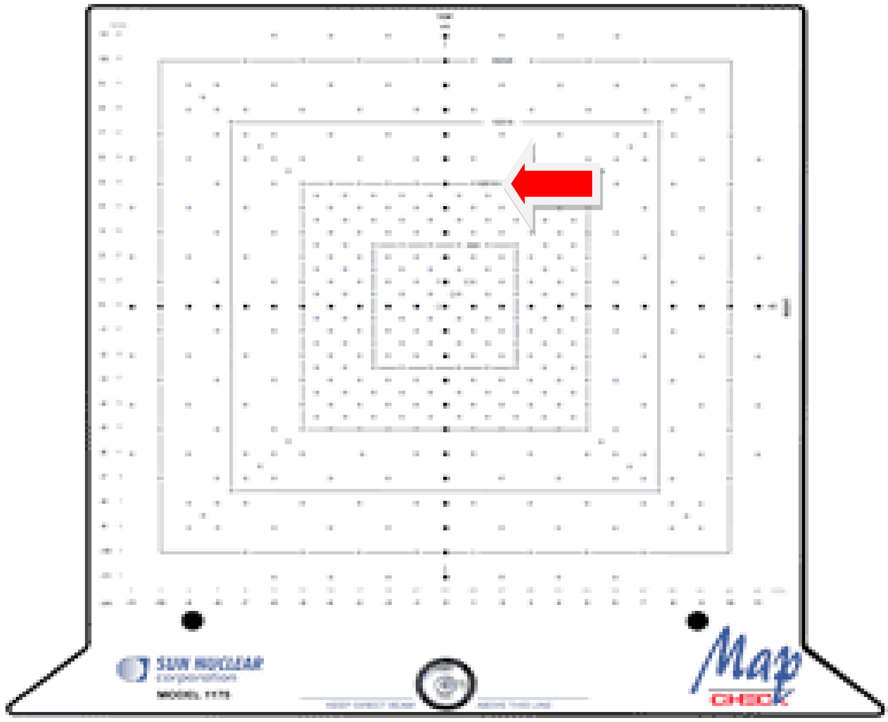

Figure 4.2: Top down view Beam's eye view of the diode showing the normalized diode position.

The fields were then combined, causing the number of diodes irradiated to increase from 22 diodes to 33 diodes, thus capturing the entire wedge travel of 30 cm due to the spacing of each diode being 0.5 cm on the central axis.

Using Excel, OA-EDWFs were then calculated relative to the corresponding and normalized to the diode irradiated within both fields.

Figure 4.3: A Farmer-type thimble chamber used for absolute wedge factors.

Using a Farmer-type ion chamber, seen in Fig. 4.3, placed perpendicular to the wedge (y-2) travel on the center axis of the field, an absolute wedge factor was ascertained. The absolute wedge factor required the delivery of an open field to be measured, followed by a delivery of the EDW. The wedge factor was then gathered using Eq. 4.1, same as the relative EDWF. Table 4.1 illustrates the absolute wedge factors from the Farmer chamber at the 6-MV energy and Table 4.2 illustrates the absolute wedge factors for the 18-MV energy.

	5-cm Depth	**10-cm Depth**	**15-cm Depth**	**20-cm Depth**
15^{o} Wedge	**0.829**	**0.822**	**0.822**	**0.824**
25^{o} Wedge	**0.729**	**0.727**	**0.727**	**0.727**
30^{o} Wedge	**0.684**	**0.682**	**0.682**	**0.684**
45^{o} Wedge	**0.554**	**0.553**	**0.552**	**0.553**
60^{o} Wedge	**0.417**	**0.417**	**0.417**	**0.418**

Table 4.1: 6-MV Absolute wedge factors obtained by Farmer chamber

	5-cm Depth	**10-cm Depth**	**15-cm Depth**	**20-cm Depth**
15^{o} Wedge	**0.877**	**0.874**	**0.873**	**0.874**
25^{o} Wedge	**0.799**	**0.798**	**0.797**	**0.797**
30^{o} Wedge	**0.762**	**0.759**	**0.761**	**0.760**
45^{o} Wedge	**0.647**	**0.645**	**0.646**	**0.646**
60^{o} Wedge	**0.513**	**0.510**	**0.512**	**0.511**

Table 4.2: 18-MV Absolute wedge factors obtained by Farmer chamber

This absolute wedge factor was then applied to the relative readings from the diode array to create an absolute EDWF. It is this absolute EDWF that has clinical significance, and can be used to examine the OA- EDWF, see Appendix A for results.

Graphical representations of each OA-EDWF, were then created to provide a convenient reference for clinical use. These graphs, similar to what is seen in Fig. 4.4, demonstrate that the segmented treatment tables deliver the EDWs with a close resemblance to a physical wedge. The remaining graphs can be found in Appendix B.

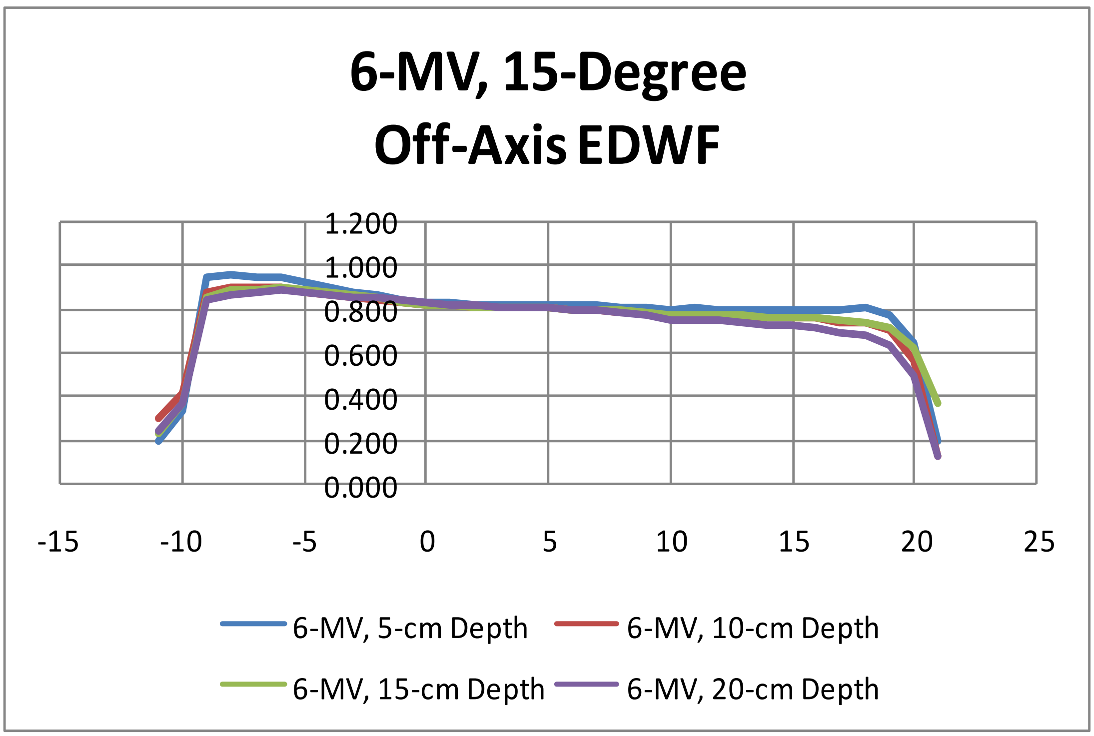

Figure 4.4: OA-EDWF for the 6-MV, 15-degree EDW at various depths.

4.2 CMS Model Results

Using the treatment planning system (TPS), CMS Xio, EDWF's were created with the same method as done within the physical experiment. The TPS uses a combination of well known calculation models **(**Clarkson, Fast Fourier Transform Convolution, and Multigrid Superposition) in various scenarios to achieve the resultant wedge factors.[4] The TPS mode of calculation, when calculating enhanced dynamic wedges, is the Fast Fourier Transform Convolution method . The model's limitation is that the WF's for points further away from the center of the beam get overestimated.

Using a Phillips CT scanner, a phantom of Solid Water[10] was scanned to create a virtual phantom to be used in the TPS. The phantom was 25 cm x 25 cm x 30 cm. This provided a deep enough depth to measure the 20 cm depth physically measured with the treatment room.

Once the phantom was created, a treatment plan was then created. The plan consisted of delivering the five wedge angles at a prescribed depth within the patient. This process was repeated for 6-MV and 18-MV beams.

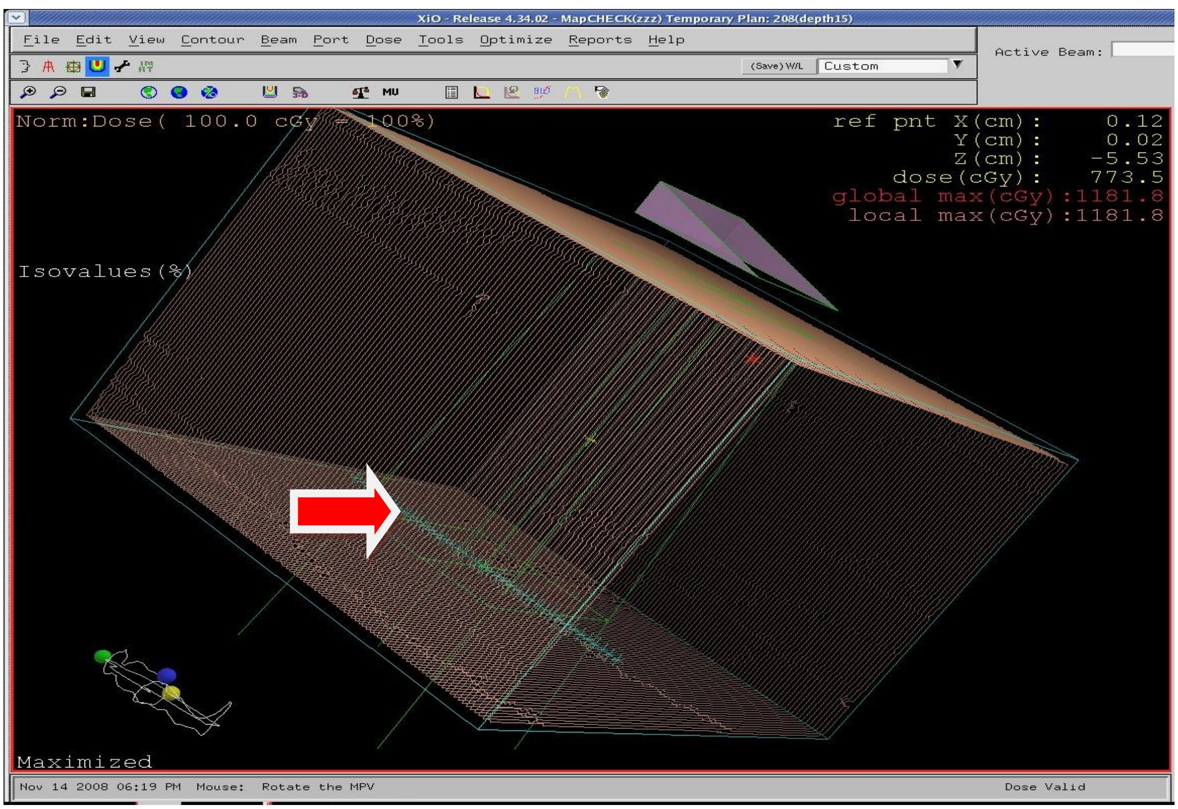

Figure 4.5: Depicts a screen capture of the beam setup with the TPS

Figure 4.5 illustrates the beam setup within the TPS. To calculate the WFs within the TPS, interest points were created within the phantom. These interest points, shown here in Fig. 4.5 with an arrow, coincide with the MapCHECK diode positions that were irradiated; therefore, each interest point was 1.0 cm away from the next. Each interest point then measured the dose delivered to it from each wedge; this data was then entered into Excel and the same data analysis was done for each wedge, depth, and energy combination. The absolute WF acquired from the Farmer chamber was applied to the TPS OA-EDWFs. Applying the absolute WF, created a comparison between the measured and theoretical OA-EDWF. All TPS OA-EDWF's are located within Appendix C**.**

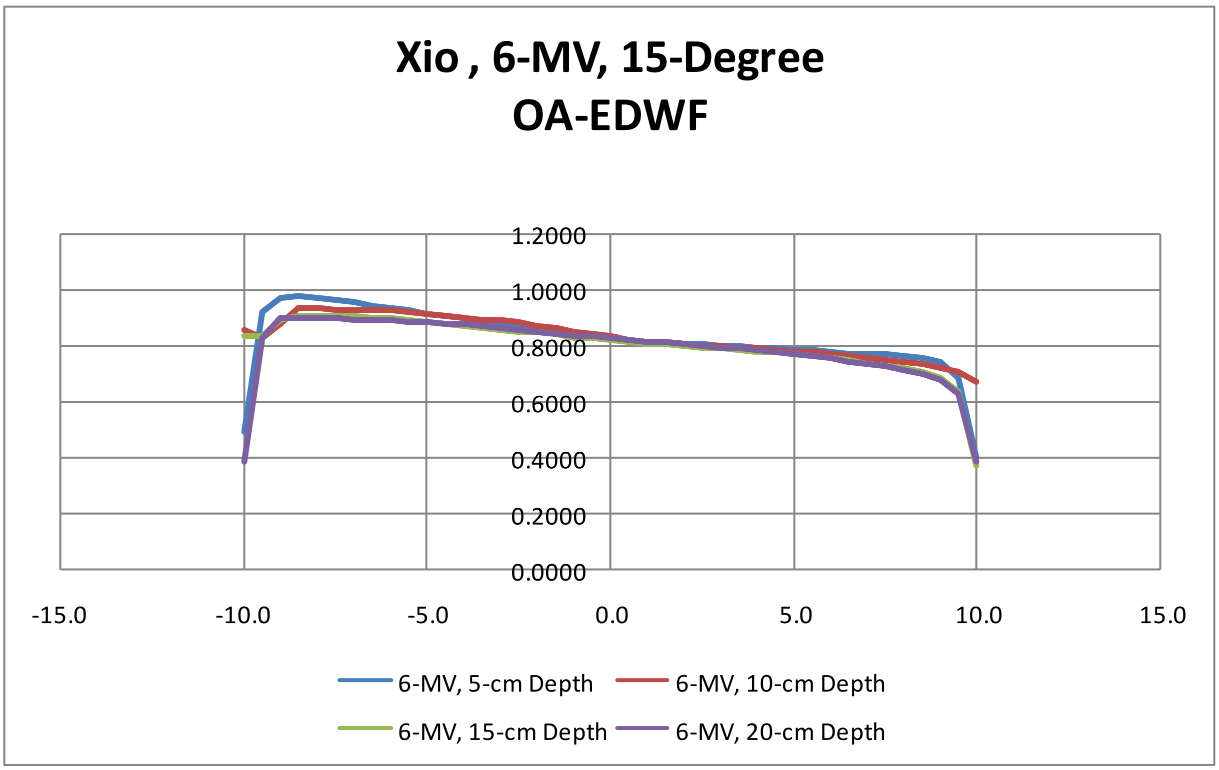

Figure 4.6: 6-MV, 15-degree OA-EDWF calculated by the TPS.

Looking at the 6-MV, 15-degree EDW at 5-cm depth within the TPS shown in Fig. 4.6, a visual comparison between the calculated and measured OA-EDWF can be completed.

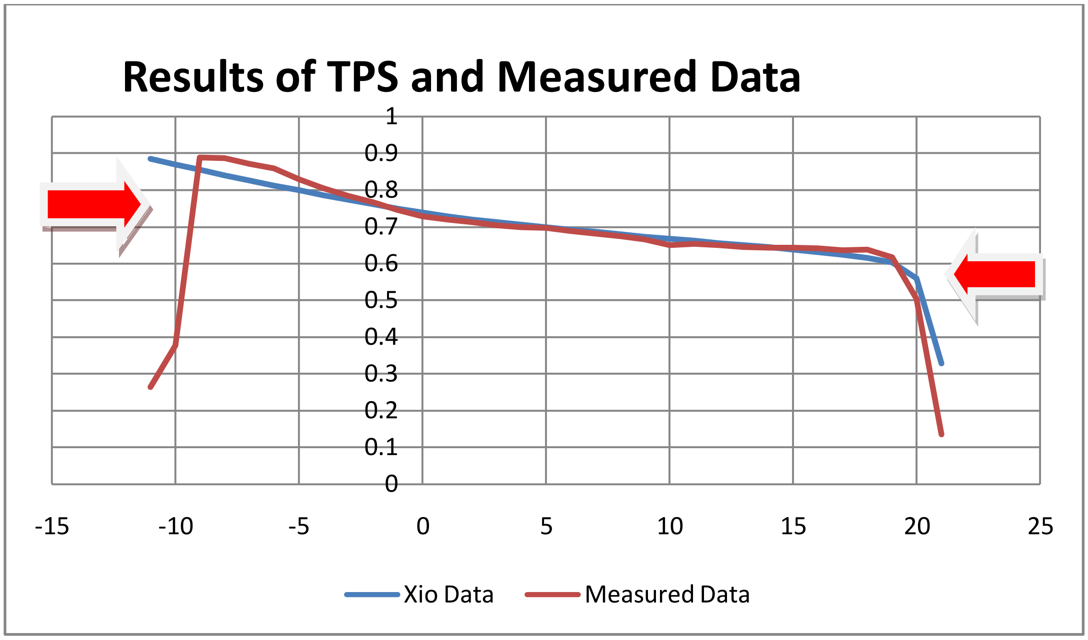

Figure 4.7: OA-EDWFs for both the measured and the TPS results.

In theory using the TPS, the WF's further away from the geometric center of the field will be overestimated. When comparing the measured results to the TPS results as seen in Fig. 4.7, this under-dosing is evident. Within the TPS, the further away from the center axis of the beam, the less accurate the EDWF is.

Table 4.3 shows the percent difference between the TPS and measured results of the OA-EDWF at the periphery of the beam for the 6-MV 15-degree EDW at all depths (see Appendix D for other percent differences). The greatest percent difference then between the TPS and measured WF's is seen in the last few centimeters of the wedged field; therefore, only the first and last 2 cm of the wedged field will be quantified. Within the central part of the field, which is more apt to be clinically utilized, the difference between the modalities is negligible, with a representative percent difference of 1-3%.

6-MV 15-Degree EDW Percent Difference of TPS vs. Actual				
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-2	103.60%	434.76%	0.19%	205.59%
2 cm	7.45%	26.08%	2.51%	27.41%
	-4.22%	2.53%	-3.50%	6.76%
	-5.75%	-0.96%	-4.35%	2.83%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	2.51%	4.07%	2.90%	3.63%
2 cm	2.69%	-0.51%	4.71%	7.32%
	177.29%	100.49%	131.10%	123.33%
	153.69%	189.39%	264.78%	61.46%

Table 4.3: Percent Difference between TPS and measured OA-EDWFs.

The percent difference between the TPS and the actual measured values is as predicted. The algorithms of the TPS do not completely and accurately model the OA-EDWF for great distances away from the center axis of the beam.

CHAPTER 5

DISCUSSION

Using the MapCHECK 2-D diode array, data was obtained to quantify these off-axis enhanced dynamic-wedge-factors (OA-EDWF) for points further away from and including the geometric center of the wedged field. It has been determined that for points 10 cm and greater away from the geometric center of an enhanced dynamic wedge will be overestimated using the CMS Xio treatment planning software.

Using the 21iX Varian linear accelerator at the nominal photon energies of 6 MV and 18 MV, the OA-EDWF's were compared to the CMS OA-EDWF's to ascertain a quantifiable significant difference between the two. Five clinically significant depths (5 cm, 10 cm, 15 cm, and 20 cm) were studied as were five different EDW angles being: 15°, 25°, 30°, 45°, and 60°. The differences were tolerable in most cases. The special cases were when a calculation point of the convolution algorithm was on the periphery of the field, as an example: when the wedge factor was at the greatest value.

Further studies should be examined for OA-EDWF's. The setup with the TPS could be adjusted; perhaps involving more simulated patient data brought in from the CT scanner. In this study, Solid Water was used to simulated depth both with the measured data and the TPS data. Given the physical size of the phantom, the TPS computed wedge factors that were to the edge of the phantom, and not the biggest possible wedged field that could be created. Another possible research endeavor could be using different algorithm that will soon be available. Further possible research could include: using a water tank and taking point measurements, using a bigger diode array to alleviate splitting up the wedged fields, using Gafchromic film, or taking actual patient fields.

It is the conclusion of this study that the CMS convolution model, used for calculating EDWF's, overestimation of 1-3% for WF's further away from the central axis of the field compared to measurements taken with a diode array. This overestimation is discussed in the theory; however justified, it should still be taken into account when dose is calculated for clinical off-center setups that require enhanced-dynamic wedges.

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APPENDIX A

15-Degree EDW
Off-Axis Factors

Distance (cm)	6 MV 5	6 MV 10	6 MV 15	6 MV 20	Distance (cm)	18 MV 5	18 MV 10	18 MV 15	18 MV 20	Distance (cm)
21	0.195	0.126	0.369	0.125	**21**	0.149	0.766	0.747	0.146	**21**
20	0.640	0.564	0.621	0.492	**20**	0.766	0.770	0.755	0.668	**20**
19	0.772	0.708	0.714	0.636	**19**	0.823	0.775	0.762	0.739	**19**
18	0.799	0.744	0.739	0.678	**18**	0.832	0.778	0.766	0.762	**18**
17	0.793	0.746	0.745	0.689	**17**	0.838	0.783	0.773	0.778	**17**
16	0.798	0.759	0.756	0.709	**16**	0.837	0.784	0.775	0.787	**16**
15	0.798	0.763	0.760	0.720	**15**	0.843	0.790	0.782	0.800	**15**
14	0.794	0.764	0.764	0.728	**14**	0.844	0.794	0.786	0.810	**14**
13	0.792	0.766	0.767	0.734	**13**	0.845	0.793	0.786	0.815	**13**
12	0.796	0.772	0.772	0.746	**12**	0.850	0.790	0.785	0.825	**12**
11	0.799	0.776	0.776	0.753	**11**	0.852	0.795	0.790	0.832	**11**
10	0.791	0.770	0.773	0.749	**10**	0.847	0.799	0.793	0.830	**10**
9	0.804	0.786	0.785	0.772	**9**	0.856	0.811	0.804	0.841	**9**
8	0.808	0.793	0.792	0.783	**8**	0.861	0.824	0.817	0.849	**8**
7	0.813	0.799	0.796	0.791	**7**	0.864	0.842	0.834	0.853	**7**
6	0.817	0.803	0.799	0.796	**6**	0.867	0.855	0.845	0.857	**6**
5	0.817	0.808	0.802	0.801	**5**	0.872	0.865	0.853	0.861	**5**
4	0.813	0.806	0.802	0.803	**4**	0.874	0.868	0.859	0.866	**4**
3	0.814	0.809	0.806	0.807	**3**	0.873	0.868	0.863	0.867	**3**
2	0.819	0.814	0.811	0.813	**2**	0.870	0.865	0.872	0.865	**2**
1	0.823	0.818	0.817	0.820	**1**	0.873	0.870	0.877	0.871	**1**
0	0.829	0.822	0.822	0.824	**0**	0.877	0.874	0.873	0.874	**0**
-1	0.843	0.834	0.834	0.836	**-1**	0.889	0.885	0.884	0.885	**-1**
-2	0.862	0.849	0.849	0.850	**-2**	0.903	0.898	0.891	0.898	**-2**
-3	0.876	0.859	0.859	0.858	**-3**	0.923	0.917	0.895	0.913	**-3**
-4	0.894	0.871	0.870	0.866	**-4**	0.937	0.930	0.898	0.924	**-4**
-5	0.916	0.885	0.882	0.875	**-5**	0.948	0.939	0.902	0.930	**-5**
-6	0.942	0.904	0.898	0.887	**-6**	0.957	0.947	0.907	0.934	**-6**
-7	0.946	0.901	0.890	0.877	**-7**	0.969	0.958	0.906	0.939	**-7**
-8	0.954	0.900	0.884	0.866	**-8**	0.972	0.955	0.905	0.931	**-8**
-9	0.945	0.883	0.858	0.836	**-9**	0.955	0.931	0.906	0.902	**-9**
-10	0.332	0.413	0.364	0.370	**-10**	0.384	0.392	0.907	0.403	**-10**
-11	0.194	0.297	0.230	0.237	**-11**	0.193	0.195	0.906	0.197	**-11**

25-Degree EDW
Off-Axis Factors

Distance (cm)	6 MV 5	10	15	20	Distance (cm)	18 MV 5	10	15	20	Distance (cm)
21	0.135	0.132	0.131	0.123	**21**	0.153	0.150	0.148	0.145	**21**
20	0.504	0.460	0.434	0.402	**20**	0.641	0.607	0.582	0.561	**20**
19	0.616	0.572	0.551	0.518	**19**	0.688	0.662	0.638	0.620	**19**
18	0.638	0.601	0.584	0.551	**18**	0.698	0.676	0.657	0.640	**18**
17	0.636	0.605	0.592	0.560	**17**	0.704	0.687	0.669	0.656	**17**
16	0.642	0.615	0.605	0.577	**16**	0.706	0.691	0.677	0.665	**16**
15	0.643	0.621	0.614	0.588	**15**	0.713	0.701	0.689	0.679	**15**
14	0.644	0.625	0.621	0.596	**14**	0.718	0.706	0.696	0.688	**14**
13	0.644	0.628	0.625	0.602	**13**	0.721	0.711	0.702	0.695	**13**
12	0.651	0.636	0.637	0.614	**12**	0.728	0.720	0.712	0.707	**12**
11	0.654	0.641	0.644	0.623	**11**	0.732	0.725	0.720	0.715	**11**
10	0.651	0.638	0.641	0.622	**10**	0.732	0.724	0.720	0.716	**10**
9	0.665	0.655	0.661	0.645	**9**	0.743	0.737	0.733	0.730	**9**
8	0.675	0.666	0.674	0.657	**8**	0.752	0.746	0.743	0.740	**8**
7	0.682	0.674	0.684	0.668	**7**	0.758	0.753	0.750	0.749	**7**
6	0.688	0.681	0.691	0.675	**6**	0.765	0.760	0.757	0.756	**6**
5	0.697	0.690	0.700	0.685	**5**	0.773	0.768	0.766	0.763	**5**
4	0.699	0.692	0.707	0.690	**4**	0.778	0.774	0.773	0.771	**4**
3	0.704	0.700	0.711	0.699	**3**	0.782	0.779	0.778	0.776	**3**
2	0.713	0.708	0.722	0.708	**2**	0.783	0.781	0.780	0.779	**2**
1	0.720	0.718	0.730	0.719	**1**	0.792	0.789	0.789	0.789	**1**
0	0.729	0.727	0.727	0.727	**0**	0.799	0.798	0.797	0.797	**0**
-1	0.747	0.744	0.747	0.742	**-1**	0.815	0.813	0.812	0.812	**-1**
-2	0.767	0.764	0.759	0.760	**-2**	0.832	0.829	0.828	0.828	**-2**
-3	0.785	0.780	0.769	0.775	**-3**	0.854	0.851	0.849	0.847	**-3**
-4	0.805	0.798	0.777	0.787	**-4**	0.872	0.868	0.865	0.861	**-4**
-5	0.830	0.820	0.786	0.803	**-5**	0.888	0.883	0.878	0.873	**-5**
-6	0.859	0.845	0.805	0.821	**-6**	0.903	0.896	0.889	0.884	**-6**
-7	0.871	0.851	0.803	0.821	**-7**	0.920	0.912	0.903	0.895	**-7**
-8	0.887	0.858	0.814	0.819	**-8**	0.930	0.917	0.904	0.894	**-8**
-9	0.889	0.850	0.815	0.801	**-9**	0.922	0.902	0.887	0.875	**-9**
-10	0.378	0.382	0.807	0.384	**-10**	0.411	0.417	0.423	0.426	**-10**
-11	0.265	0.266	0.809	0.266	**-11**	0.239	0.239	0.241	0.242	**-11**

30-Degree EDW
Off-Axis Factors

Distance (cm)	6 MV 5	10	15	20	Distance (cm)	18 MV 5	10	15	20	Distance (cm)
21	0.139	0.134	0.130	0.122	**21**	0.155	0.152	0.150	0.146	**21**
20	0.457	0.415	0.385	0.365	**20**	0.582	0.554	0.531	0.512	**20**
19	0.552	0.512	0.485	0.465	**19**	0.625	0.603	0.582	0.565	**19**
18	0.571	0.537	0.513	0.495	**18**	0.634	0.617	0.600	0.584	**18**
17	0.570	0.541	0.520	0.504	**17**	0.641	0.627	0.613	0.598	**17**
16	0.576	0.551	0.533	0.519	**16**	0.644	0.632	0.620	0.608	**16**
15	0.579	0.558	0.542	0.530	**15**	0.652	0.642	0.633	0.622	**15**
14	0.580	0.562	0.549	0.538	**14**	0.657	0.648	0.640	0.632	**14**
13	0.583	0.565	0.554	0.544	**13**	0.661	0.654	0.647	0.639	**13**
12	0.589	0.575	0.565	0.557	**12**	0.670	0.663	0.658	0.651	**12**
11	0.593	0.580	0.573	0.567	**11**	0.676	0.670	0.666	0.661	**11**
10	0.591	0.579	0.572	0.565	**10**	0.677	0.671	0.669	0.664	**10**
9	0.607	0.597	0.593	0.588	**9**	0.689	0.685	0.682	0.679	**9**
8	0.617	0.608	0.605	0.602	**8**	0.699	0.695	0.693	0.689	**8**
7	0.626	0.618	0.615	0.614	**7**	0.708	0.703	0.702	0.700	**7**
6	0.634	0.627	0.624	0.623	**6**	0.716	0.712	0.710	0.708	**6**
5	0.644	0.637	0.635	0.633	**5**	0.726	0.722	0.721	0.718	**5**
4	0.647	0.642	0.640	0.640	**4**	0.733	0.729	0.730	0.727	**4**
3	0.654	0.650	0.649	0.649	**3**	0.739	0.735	0.736	0.734	**3**
2	0.663	0.660	0.660	0.660	**2**	0.743	0.740	0.741	0.739	**2**
1	0.673	0.671	0.672	0.672	**1**	0.752	0.750	0.751	0.750	**1**
0	0.684	0.682	0.682	0.684	**0**	0.762	0.759	0.761	0.760	**0**
-1	0.701	0.700	0.699	0.700	**-1**	0.778	0.776	0.777	0.776	**-1**
-2	0.723	0.720	0.719	0.719	**-2**	0.797	0.794	0.795	0.794	**-2**
-3	0.742	0.738	0.735	0.734	**-3**	0.820	0.816	0.817	0.814	**-3**
-4	0.763	0.758	0.753	0.749	**-4**	0.839	0.835	0.834	0.830	**-4**
-5	0.789	0.781	0.773	0.767	**-5**	0.858	0.852	0.850	0.845	**-5**
-6	0.819	0.807	0.796	0.787	**-6**	0.875	0.868	0.864	0.857	**-6**
-7	0.834	0.816	0.801	0.791	**-7**	0.893	0.885	0.880	0.871	**-7**
-8	0.852	0.828	0.807	0.793	**-8**	0.906	0.894	0.885	0.874	**-8**
-9	0.857	0.824	0.798	0.780	**-9**	0.902	0.884	0.871	0.858	**-9**
-10	0.386	0.387	0.388	0.390	**-10**	0.419	0.426	0.432	0.435	**-10**
-11	0.280	0.279	0.278	0.281	**-11**	0.257	0.258	0.260	0.260	**-11**

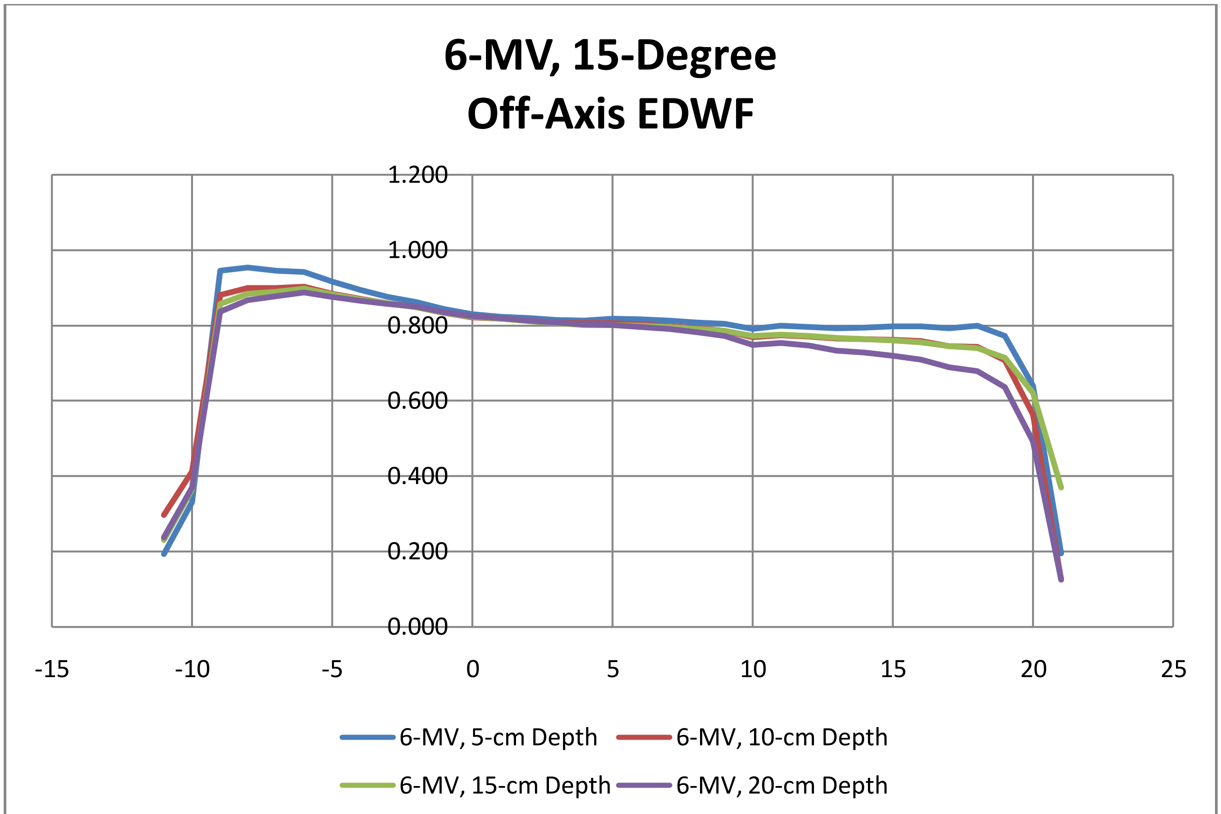
45-Degree EDW
Off-Axis Factors

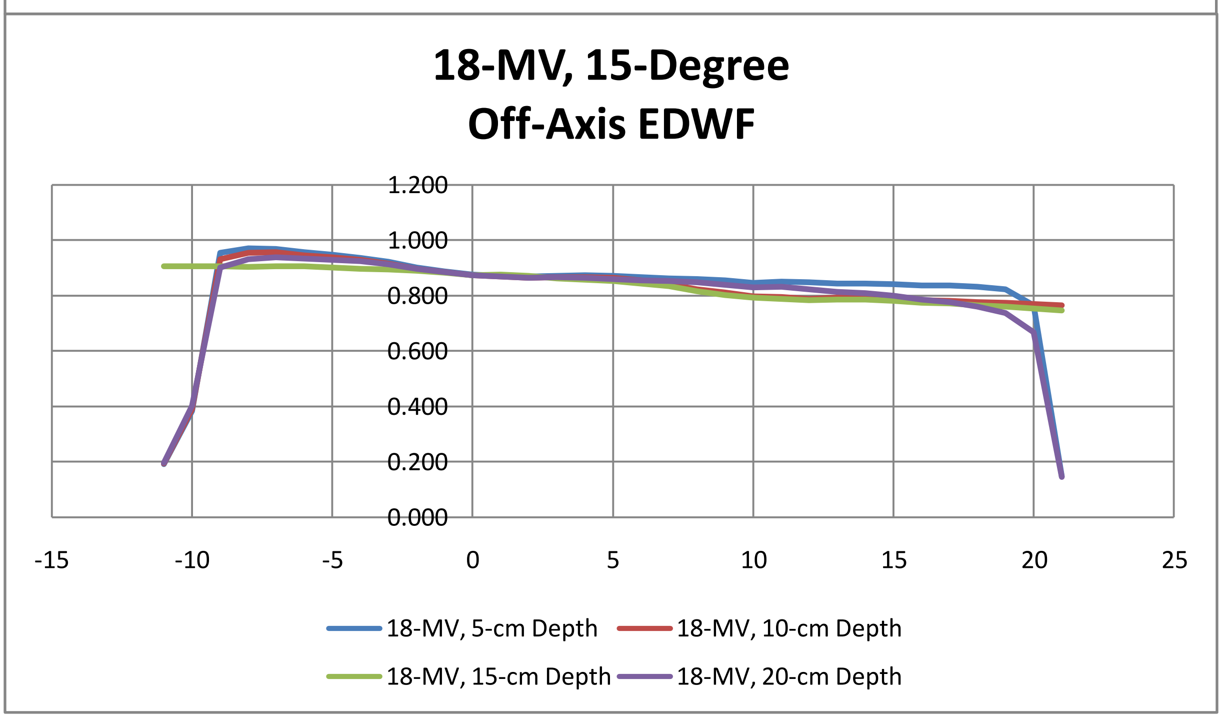
Distance (cm)	6 MV 5	10	15	20	Distance (cm)	18 MV 5	10	15	20	Distance (cm)
21	0.290	0.141	0.134	0.129	**21**	0.160	0.155	0.152	0.150	**21**
20	0.304	0.292	0.272	0.260	**20**	0.414	0.394	0.380	0.370	**20**
19	0.305	0.351	0.333	0.322	**19**	0.443	0.428	0.415	0.406	**19**
18	0.316	0.368	0.351	0.341	**18**	0.453	0.440	0.429	0.421	**18**
17	0.319	0.373	0.358	0.349	**17**	0.461	0.451	0.441	0.434	**17**
16	0.328	0.381	0.368	0.360	**16**	0.467	0.458	0.450	0.443	**16**
15	0.336	0.389	0.377	0.371	**15**	0.477	0.469	0.462	0.457	**15**
14	0.343	0.395	0.385	0.379	**14**	0.485	0.478	0.472	0.468	**14**
13	0.353	0.401	0.391	0.385	**13**	0.493	0.487	0.482	0.478	**13**
12	0.365	0.411	0.403	0.399	**12**	0.505	0.499	0.495	0.492	**12**
11	0.377	0.420	0.412	0.409	**11**	0.514	0.509	0.505	0.503	**11**
10	0.390	0.423	0.414	0.410	**10**	0.520	0.515	0.512	0.510	**10**
9	0.408	0.441	0.436	0.433	**9**	0.535	0.531	0.529	0.528	**9**
8	0.430	0.455	0.450	0.449	**8**	0.549	0.545	0.543	0.543	**8**
7	0.450	0.468	0.464	0.463	**7**	0.561	0.558	0.556	0.556	**7**
6	0.473	0.481	0.476	0.476	**6**	0.575	0.571	0.570	0.570	**6**
5	0.500	0.495	0.491	0.490	**5**	0.590	0.587	0.586	0.584	**5**
4	0.507	0.503	0.500	0.500	**4**	0.601	0.598	0.598	0.597	**4**
3	0.517	0.514	0.512	0.511	**3**	0.610	0.608	0.608	0.607	**3**
2	0.529	0.527	0.525	0.525	**2**	0.620	0.617	0.618	0.617	**2**
1	0.541	0.539	0.539	0.540	**1**	0.633	0.631	0.632	0.632	**1**
0	0.554	0.553	0.553	0.553	**0**	0.647	0.645	0.646	0.646	**0**
-1	0.572	0.572	0.571	0.571	**-1**	0.665	0.664	0.665	0.665	**-1**
-2	0.594	0.594	0.592	0.592	**-2**	0.686	0.685	0.686	0.685	**-2**
-3	0.614	0.614	0.611	0.611	**-3**	0.710	0.709	0.709	0.708	**-3**
-4	0.637	0.635	0.632	0.630	**-4**	0.733	0.731	0.731	0.728	**-4**
-5	0.664	0.661	0.655	0.651	**-5**	0.755	0.753	0.751	0.749	**-5**
-6	0.695	0.689	0.681	0.675	**-6**	0.777	0.774	0.770	0.766	**-6**
-7	0.715	0.705	0.694	0.687	**-7**	0.801	0.796	0.791	0.786	**-7**
-8	0.738	0.722	0.707	0.698	**-8**	0.819	0.811	0.804	0.797	**-8**
-9	0.752	0.729	0.710	0.696	**-9**	0.823	0.812	0.801	0.793	**-9**
-10	0.382	0.385	0.385	0.386	**-10**	0.429	0.433	0.437	0.441	**-10**
-11	0.301	0.300	0.298	0.299	**-11**	0.297	0.294	0.295	0.296	**-11**

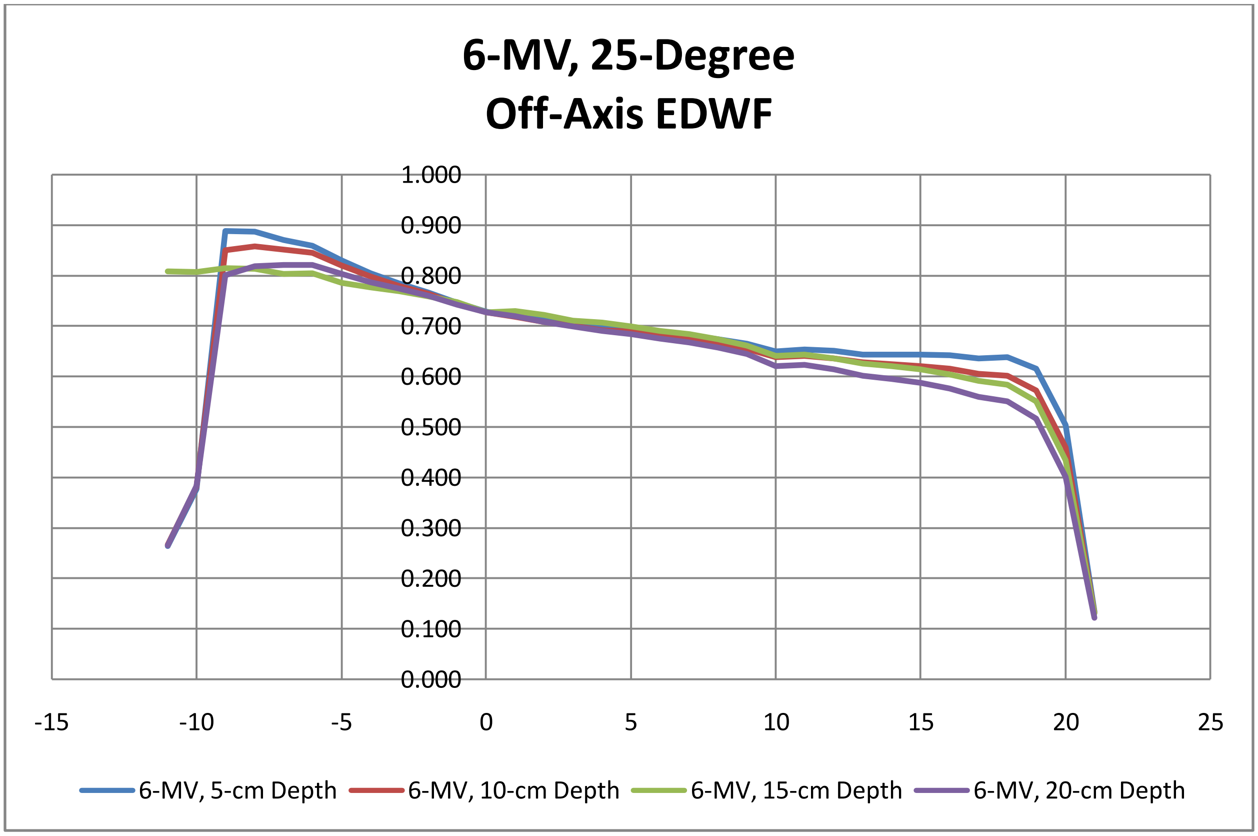
60-Degree EDW
Off-Axis Factors

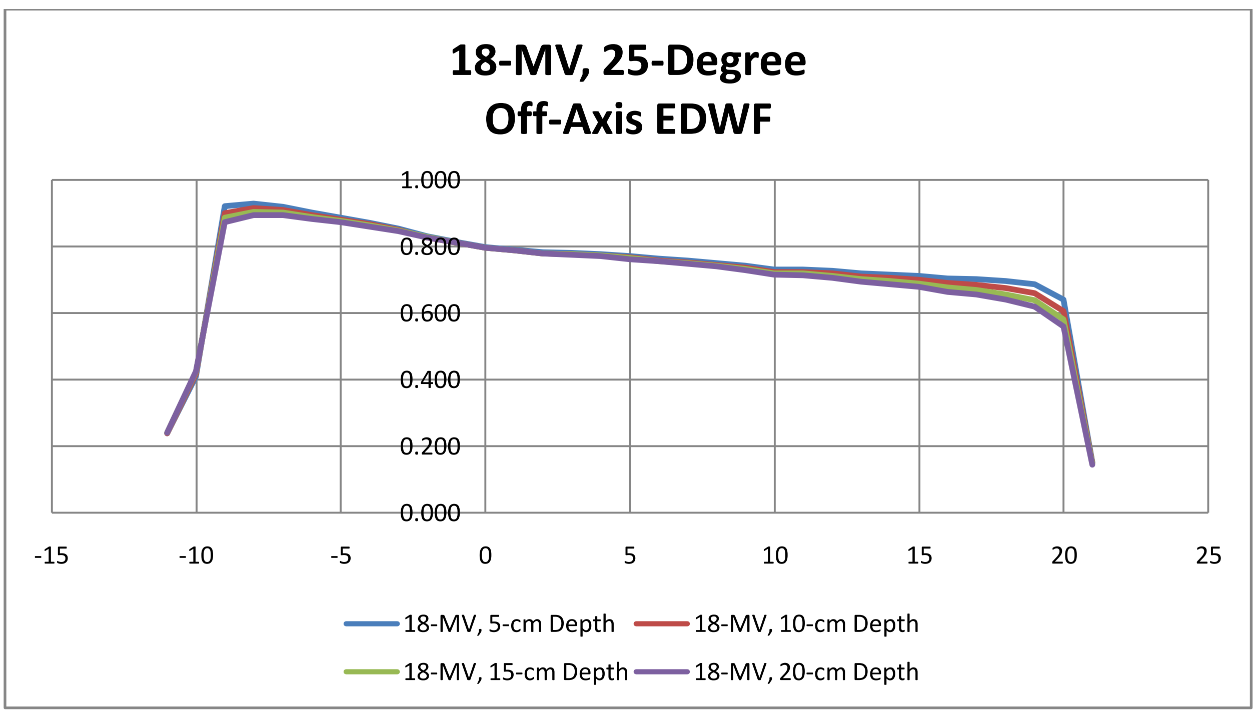
	6 MV					18 MV				
Distance (cm)	5	10	15	20	Distance (cm)	5	10	15	20	Distance (cm)
21	0.152	0.143	0.136	0.149	**21**	0.163	0.157	0.154	0.150	**21**
20	0.186	0.174	0.165	0.183	**20**	0.239	0.230	0.224	0.218	**20**
19	0.206	0.196	0.189	0.213	**19**	0.255	0.248	0.242	0.237	**19**
18	0.214	0.205	0.198	0.224	**18**	0.265	0.258	0.253	0.248	**18**
17	0.220	0.211	0.205	0.232	**17**	0.275	0.268	0.264	0.259	**17**
16	0.226	0.218	0.212	0.241	**16**	0.284	0.277	0.273	0.269	**16**
15	0.234	0.227	0.221	0.252	**15**	0.296	0.290	0.286	0.282	**15**
14	0.242	0.235	0.230	0.262	**14**	0.307	0.301	0.298	0.295	**14**
13	0.250	0.242	0.237	0.270	**13**	0.318	0.312	0.309	0.305	**13**
12	0.261	0.254	0.250	0.286	**12**	0.332	0.327	0.324	0.321	**12**
11	0.271	0.264	0.260	0.298	**11**	0.345	0.339	0.337	0.335	**11**
10	0.277	0.271	0.266	0.303	**10**	0.356	0.350	0.349	0.346	**10**
9	0.296	0.290	0.287	0.329	**9**	0.374	0.370	0.368	0.366	**9**
8	0.310	0.306	0.303	0.348	**8**	0.391	0.387	0.385	0.384	**8**
7	0.326	0.322	0.319	0.368	**7**	0.408	0.404	0.403	0.402	**7**
6	0.342	0.338	0.335	0.386	**6**	0.426	0.422	0.421	0.420	**6**
5	0.360	0.356	0.353	0.407	**5**	0.446	0.442	0.441	0.439	**5**
4	0.369	0.366	0.364	0.408	**4**	0.459	0.455	0.455	0.453	**4**
3	0.379	0.377	0.375	0.410	**3**	0.470	0.467	0.467	0.466	**3**
2	0.391	0.390	0.388	0.413	**2**	0.483	0.480	0.481	0.480	**2**
1	0.403	0.403	0.402	0.417	**1**	0.498	0.495	0.496	0.496	**1**
0	0.417	0.417	0.417	0.418	**0**	0.513	0.511	0.512	0.511	**0**
-1	0.433	0.434	0.435	0.424	**-1**	0.532	0.530	0.532	0.531	**-1**
-2	0.453	0.454	0.454	0.431	**-2**	0.553	0.551	0.553	0.553	**-2**
-3	0.472	0.473	0.473	0.435	**-3**	0.577	0.575	0.577	0.576	**-3**
-4	0.493	0.494	0.493	0.440	**-4**	0.600	0.598	0.599	0.598	**-4**
-5	0.518	0.518	0.516	0.444	**-5**	0.623	0.621	0.622	0.620	**-5**
-6	0.546	0.545	0.541	0.451	**-6**	0.647	0.644	0.644	0.641	**-6**
-7	0.567	0.564	0.557	0.445	**-7**	0.672	0.668	0.668	0.664	**-7**
-8	0.591	0.584	0.574	0.439	**-8**	0.693	0.688	0.685	0.680	**-8**
-9	0.608	0.595	0.583	0.424	**-9**	0.705	0.695	0.690	0.685	**-9**
-10	0.342	0.345	0.347	0.187	**-10**	0.406	0.409	0.412	0.415	**-10**
-11	0.283	0.284	0.284	0.120	**-11**	0.305	0.303	0.304	0.304	**-11**

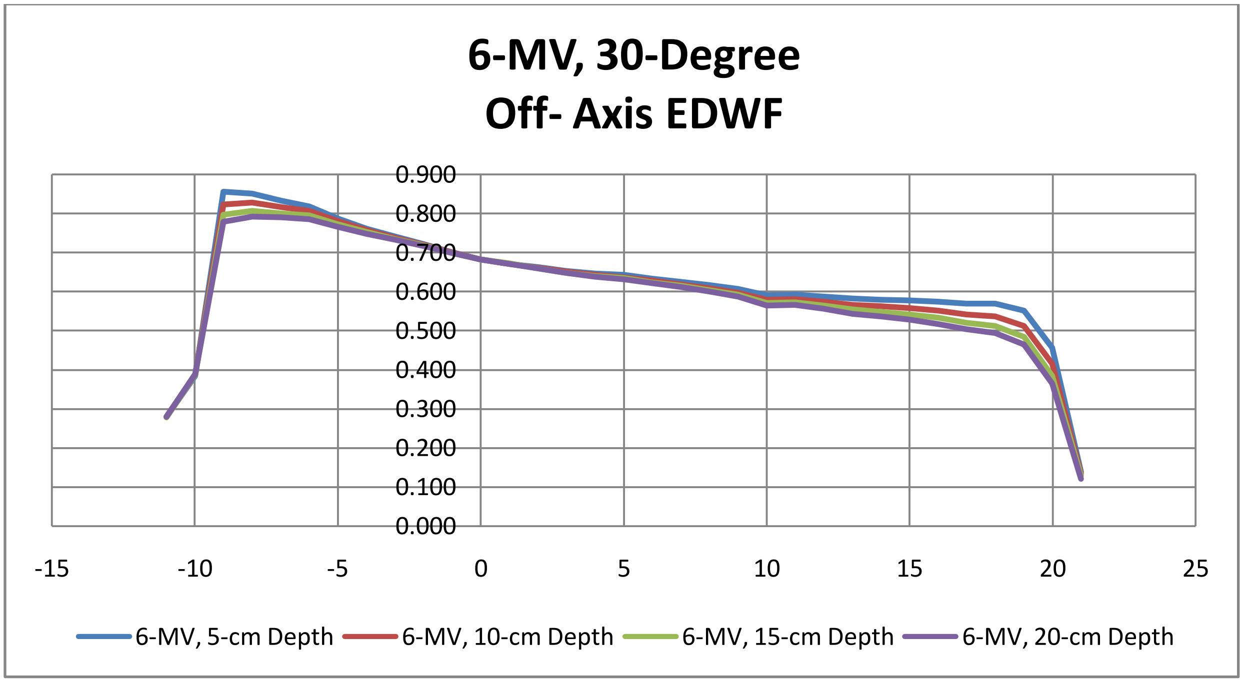
APPENDIX B

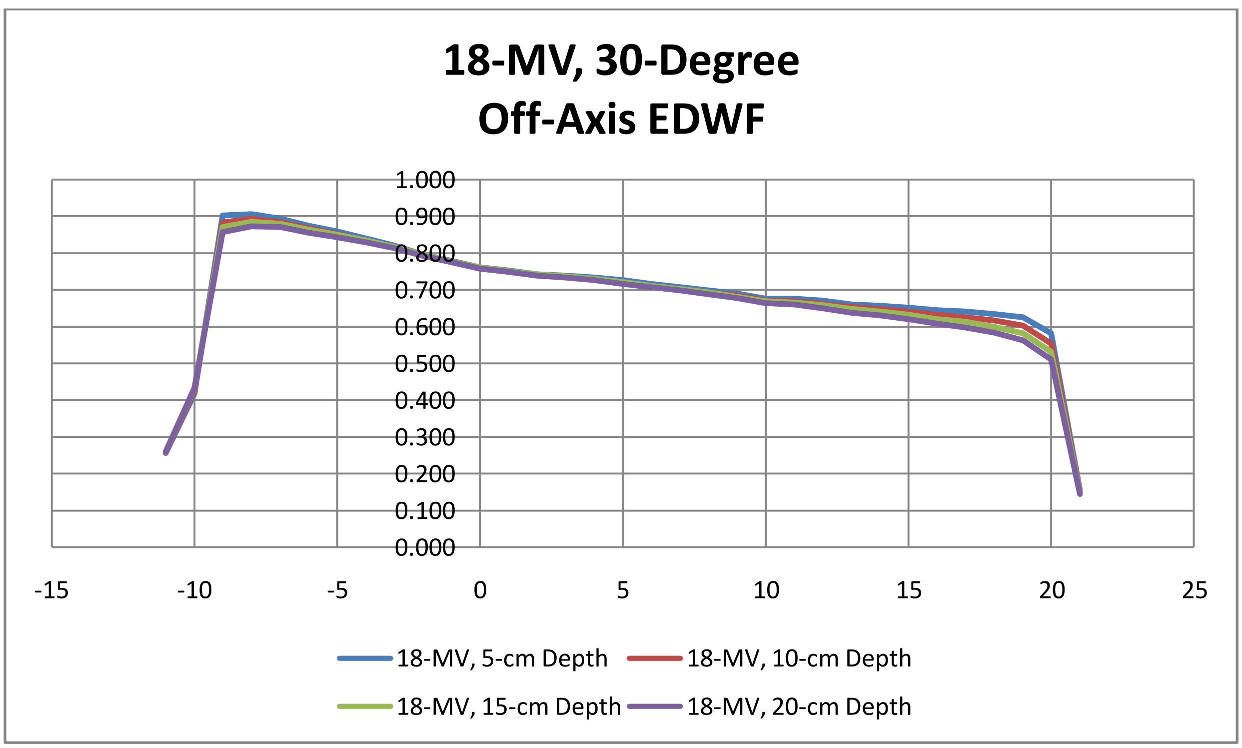

6-MV, 15-Degree
Off-Axis EDWF
1.200
1.000
0.800
0.600
0.400
0.200
0.000
-15
-10
-5
0
5
10
15
20
25
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth

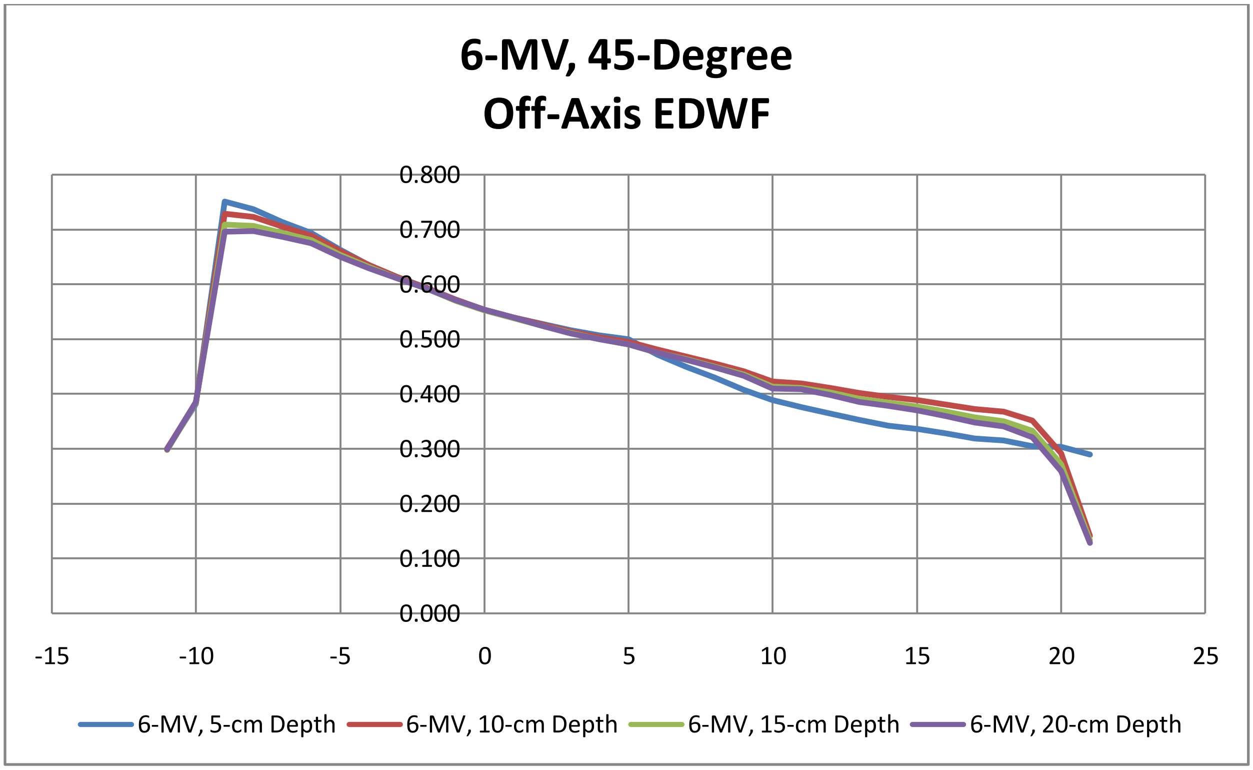

18-MV, 15-Degree
Off-Axis EDWF
1.200
1.000
0.800
0.600
0.400
0.200
0.000
-15
-10
-5
0
5
10
15
20
25
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

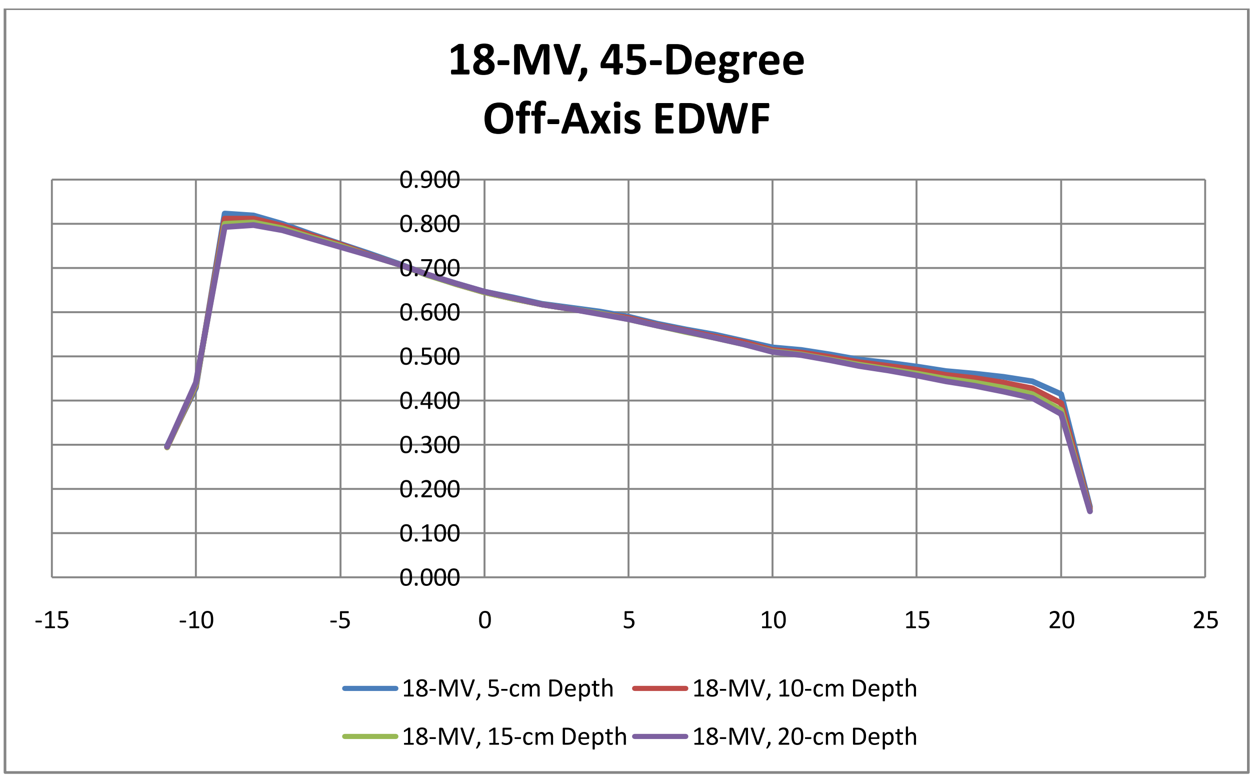

6-MV, 25-Degree
Off-Axis EDWF
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth

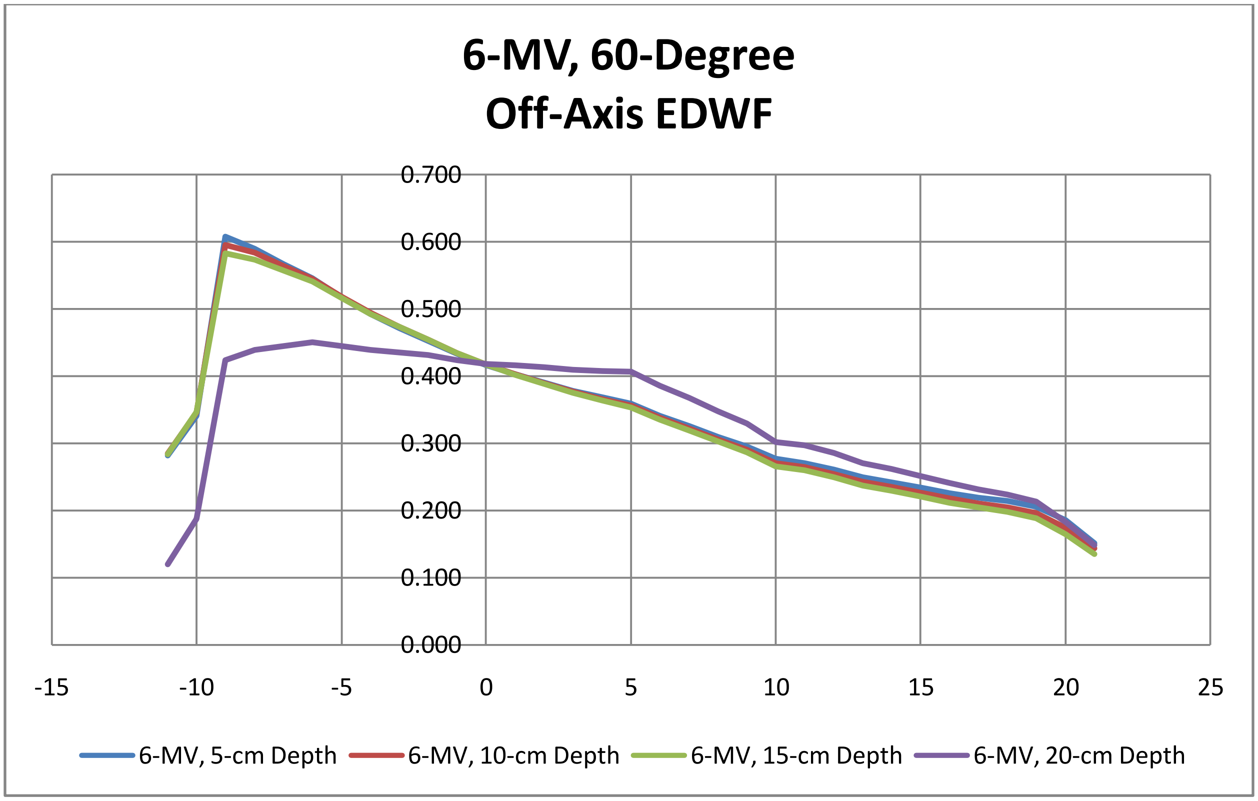

18-MV, 25-Degree
Off-Axis EDWF
1.000
0.800
0.600
0.400
0.200
0.000
-15
-10
-5
0
5
10
15
20
25
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

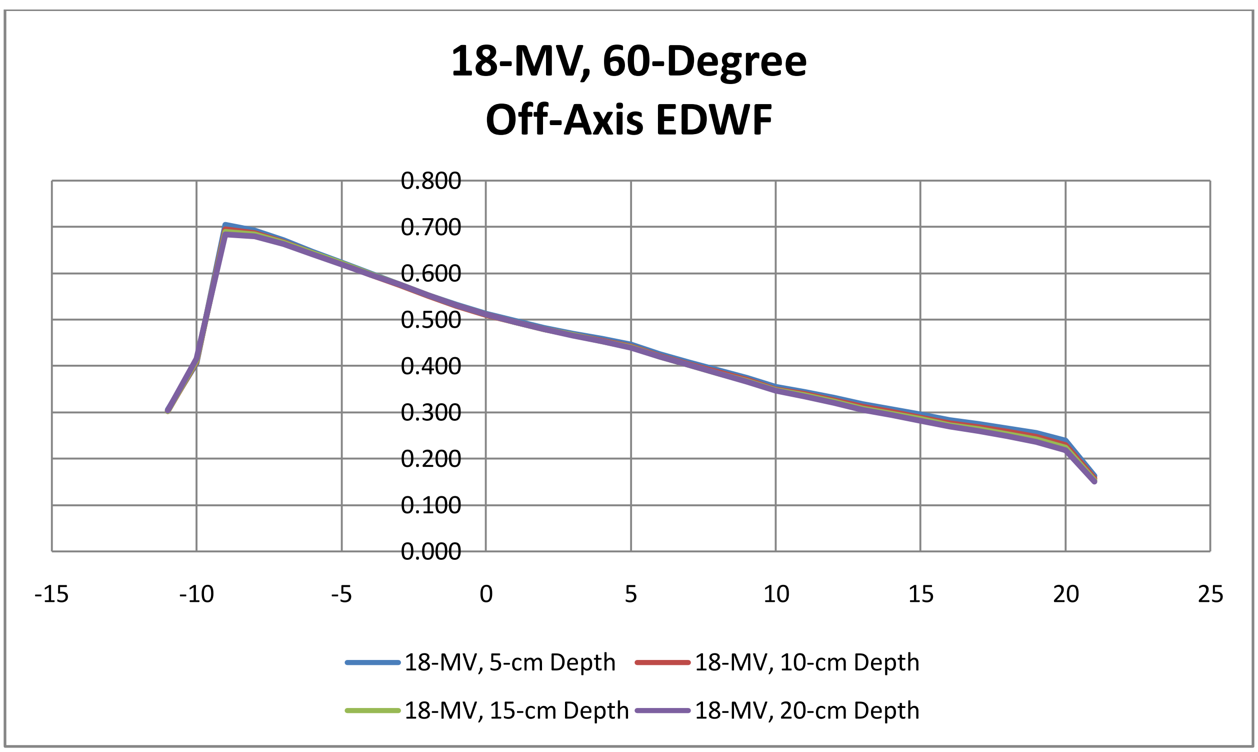

6-MV, 30-Degree
Off- Axis EDWF
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth


18-MV, 30-Degree
Off-Axis EDWF
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

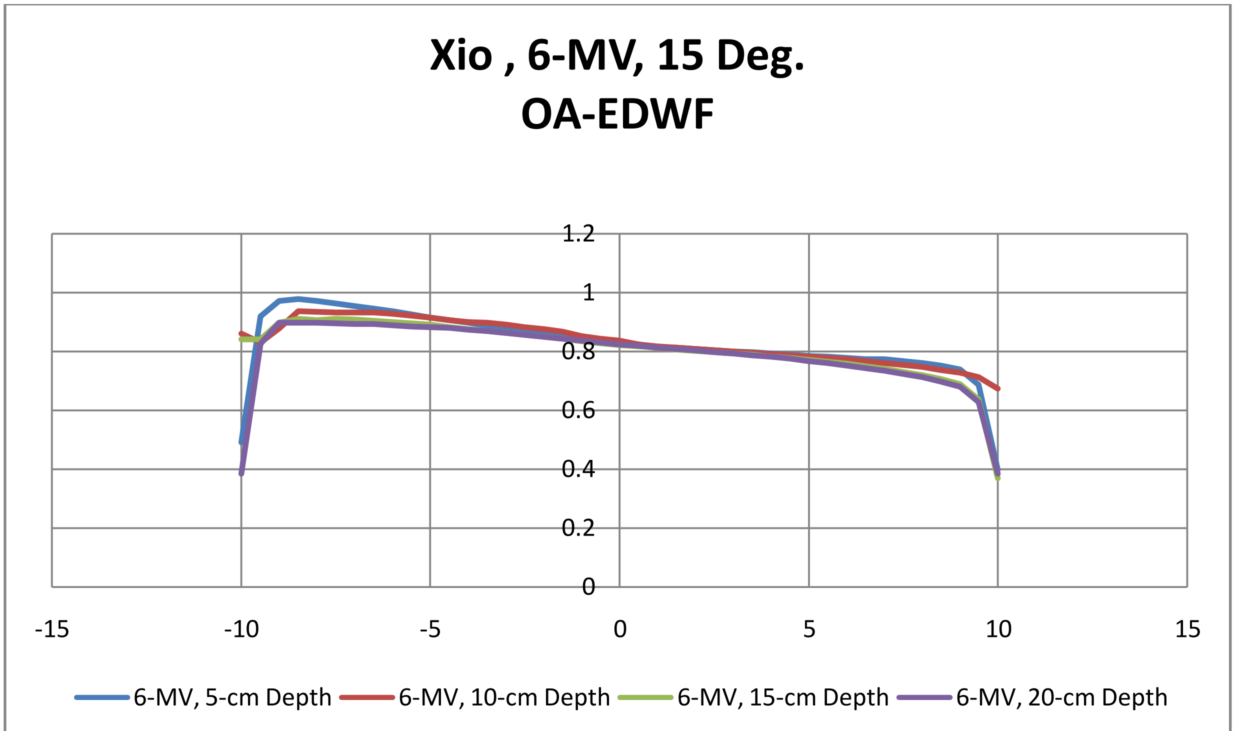

6-MV, 45-Degree
Off-Axis EDWF
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth

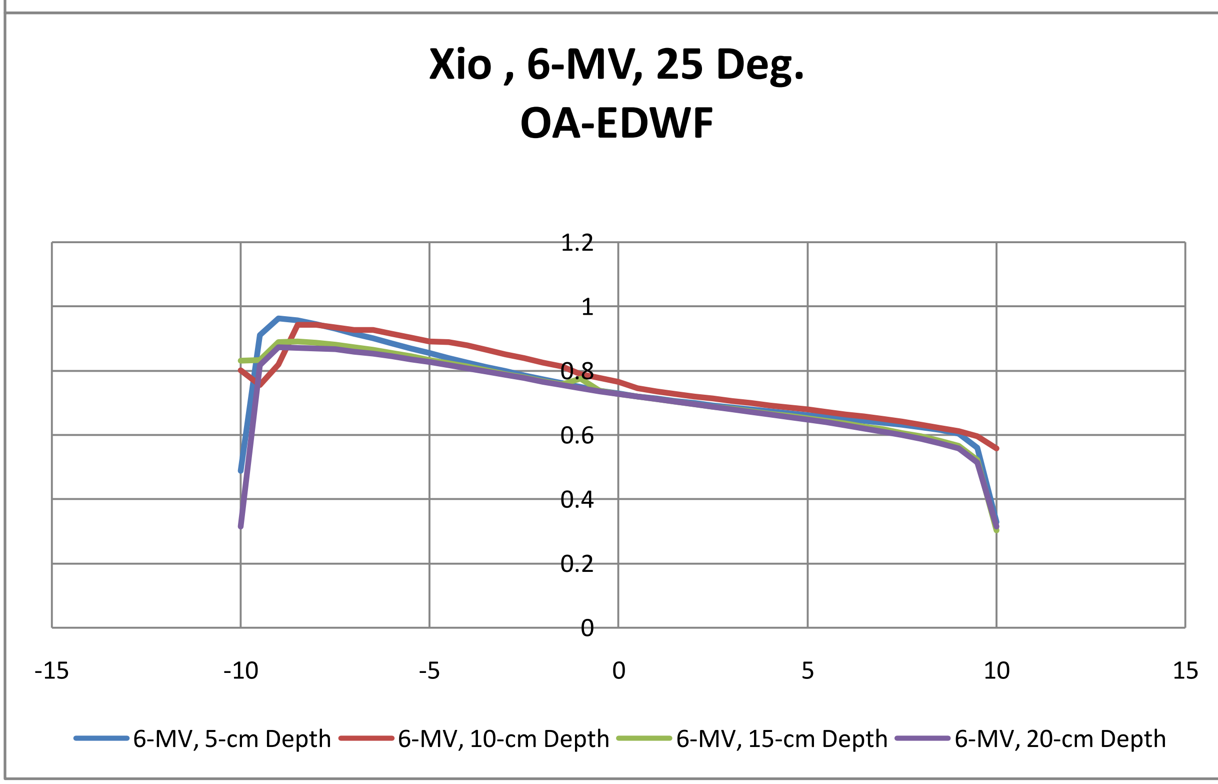

18-MV, 45-Degree
Off-Axis EDWF
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

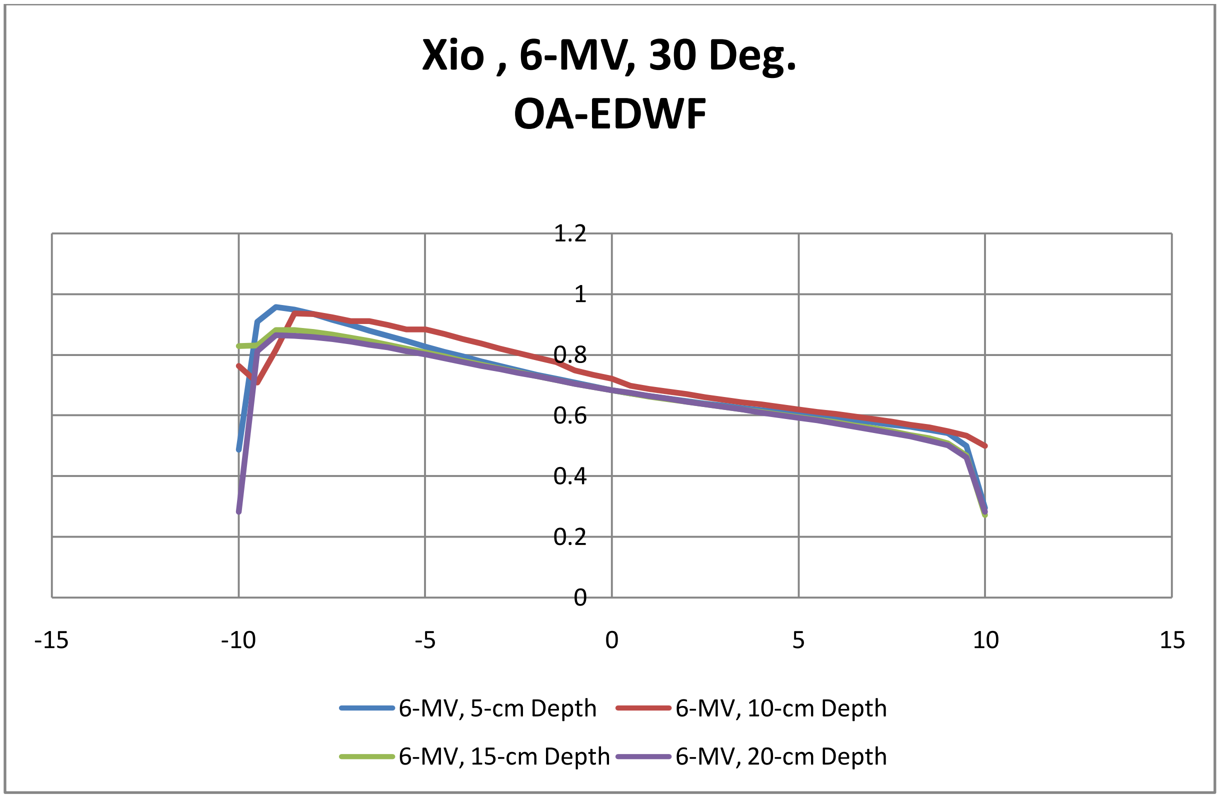

6-MV, 60-Degree
Off-Axis EDWF
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth

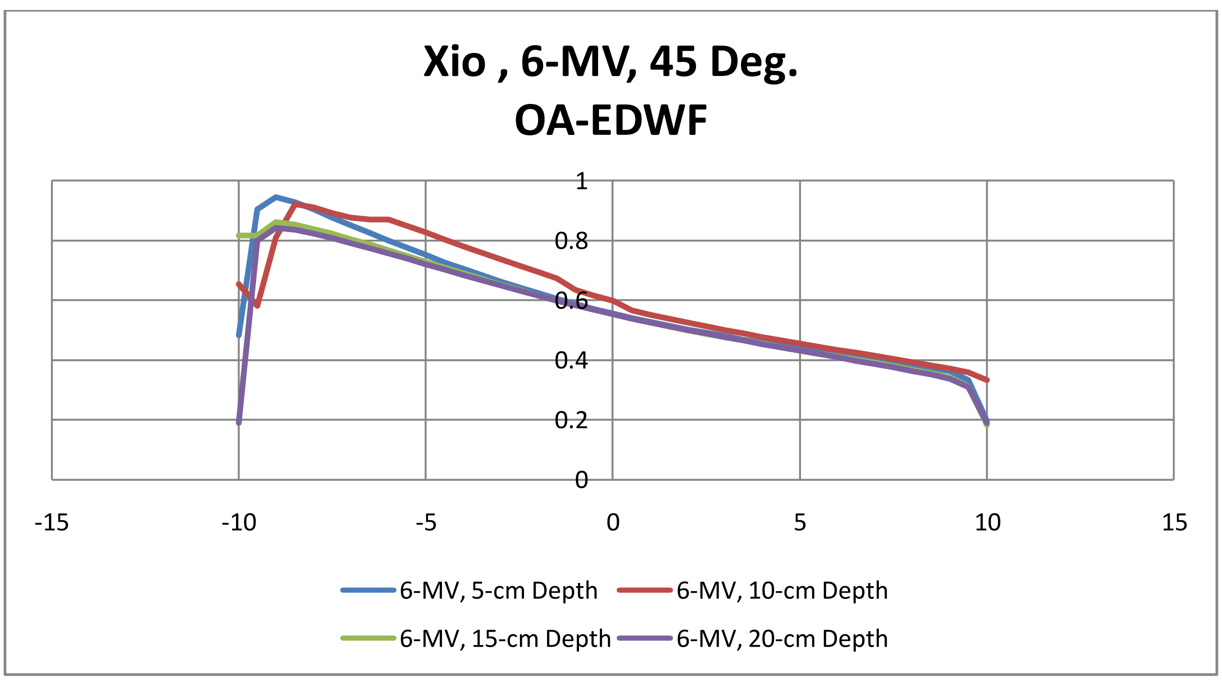

18-MV, 60-Degree
Off-Axis EDWF
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-15
-10
-5
0
5
10
15
20
25
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

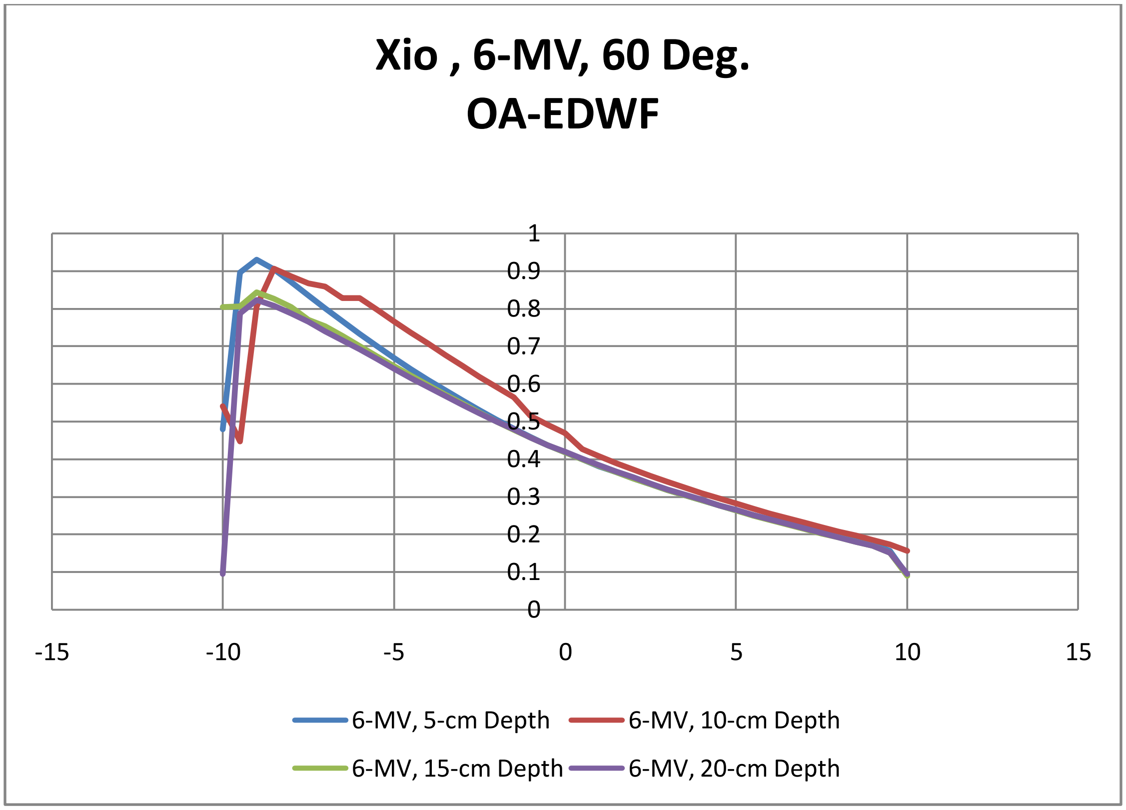
APPENDIX C


Xio , 6-MV, 15 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth


Xio , 6-MV, 25 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth


Xio , 6-MV, 30 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth


Xio , 6-MV, 45 Deg.
OA-EDWF
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth


Xio , 6-MV, 60 Deg.
OA-EDWF
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-15
-10
-5
0
5
10
15
6-MV, 5-cm Depth
6-MV, 10-cm Depth
6-MV, 15-cm Depth
6-MV, 20-cm Depth

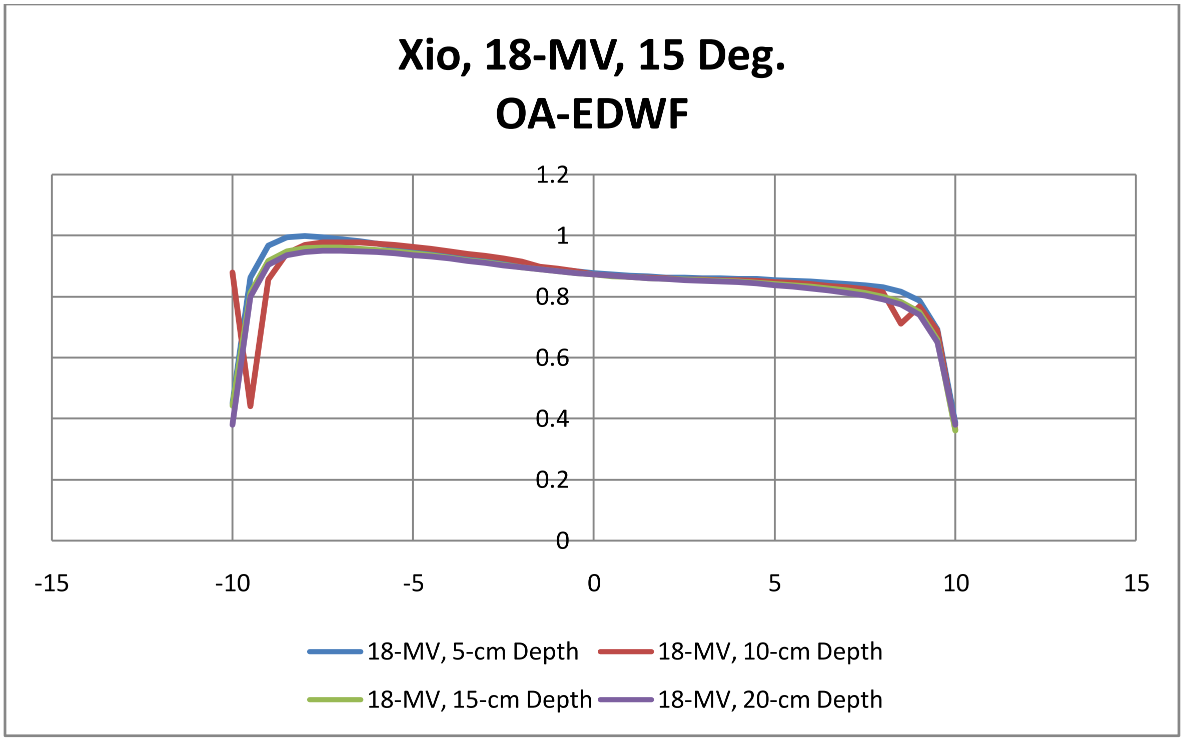
CMS Xio EDW Off-Axis Wedge Factors 6 MV at 5 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3980	0.3289	0.2946	0.1950	0.0904	**10.0**
9.5	0.6873	0.5593	0.5004	0.3323	0.1550	**9.5**
9.0	0.7396	0.6038	0.5407	0.3623	0.1734	**9.0**
8.5	0.7528	0.6162	0.5530	0.3739	0.1846	**8.5**
8.0	0.7611	0.6242	0.5619	0.3833	0.1946	**8.0**
7.5	0.7669	0.6315	0.5701	0.3922	0.2055	**7.5**
7.0	0.7727	0.6388	0.5769	0.4016	0.2159	**7.0**
6.5	0.7727	0.6447	0.5838	0.4104	0.2284	**6.5**
6.0	0.7777	0.6505	0.5906	0.4193	0.2388	**6.0**
5.5	0.7819	0.6563	0.5974	0.4287	0.2505	**5.5**
5.0	0.7852	0.6622	0.6043	0.4381	0.2626	**5.0**
4.5	0.7893	0.6680	0.6111	0.4476	0.2755	**4.5**
4.0	0.7926	0.6738	0.6179	0.4575	0.2888	**4.0**
3.5	0.7968	0.6797	0.6248	0.4680	0.3026	**3.5**
3.0	0.8001	0.6862	0.6323	0.4791	0.3168	**3.0**
2.5	0.8034	0.6928	0.6398	0.4902	0.3318	**2.5**
2.0	0.8076	0.6994	0.6480	0.5018	0.3472	**2.0**
1.5	0.8117	0.7059	0.6562	0.5140	0.3639	**1.5**
1.0	0.8150	0.7132	0.6644	0.5268	0.3805	**1.0**
0.5	0.8233	0.7205	0.6733	0.5395	0.3985	**0.5**
0.0	0.8291	0.7293	0.6836	0.5539	0.4168	**0.0**
-0.5	0.8357	0.7387	0.6952	0.5694	0.4368	**-0.5**
-1.0	0.8432	0.7504	0.7075	0.5866	0.4585	**-1.0**
-1.5	0.8515	0.7621	0.7205	0.6043	0.4810	**-1.5**
-2.0	0.8598	0.7737	0.7341	0.6226	0.5047	**-2.0**
-2.5	0.8689	0.7861	0.7485	0.6420	0.5293	**-2.5**
-3.0	0.8780	0.7993	0.7635	0.6625	0.5552	**-3.0**
-3.5	0.8871	0.8124	0.7786	0.6835	0.5823	**-3.5**
-4.0	0.8963	0.8263	0.7943	0.7046	0.6098	**-4.0**
-4.5	0.9054	0.8401	0.8107	0.7273	0.6389	**-4.5**
-5.0	0.9153	0.8554	0.8278	0.7511	0.6694	**-5.0**
-5.5	0.9253	0.8700	0.8449	0.7749	0.7006	**-5.5**
-6.0	0.9352	0.8853	0.8626	0.7998	0.7327	**-6.0**
-6.5	0.9452	0.9006	0.8804	0.8253	0.7661	**-6.5**
-7.0	0.9543	0.9152	0.8982	0.8508	0.7998	**-7.0**
-7.5	0.9626	0.9305	0.9160	0.8768	0.8348	**-7.5**
-8.0	0.9717	0.9451	0.9337	0.9034	0.8698	**-8.0**
-8.5	0.9775	0.9582	0.9495	0.9278	0.9036	**-8.5**
-9.0	0.9709	0.9634	0.9577	0.9450	0.9299	**-9.0**
-9.5	0.9195	0.9123	0.9091	0.9034	0.8961	**-9.5**
-10.0	0.4917	0.4879	0.4860	0.4830	0.4789	**-10.0**

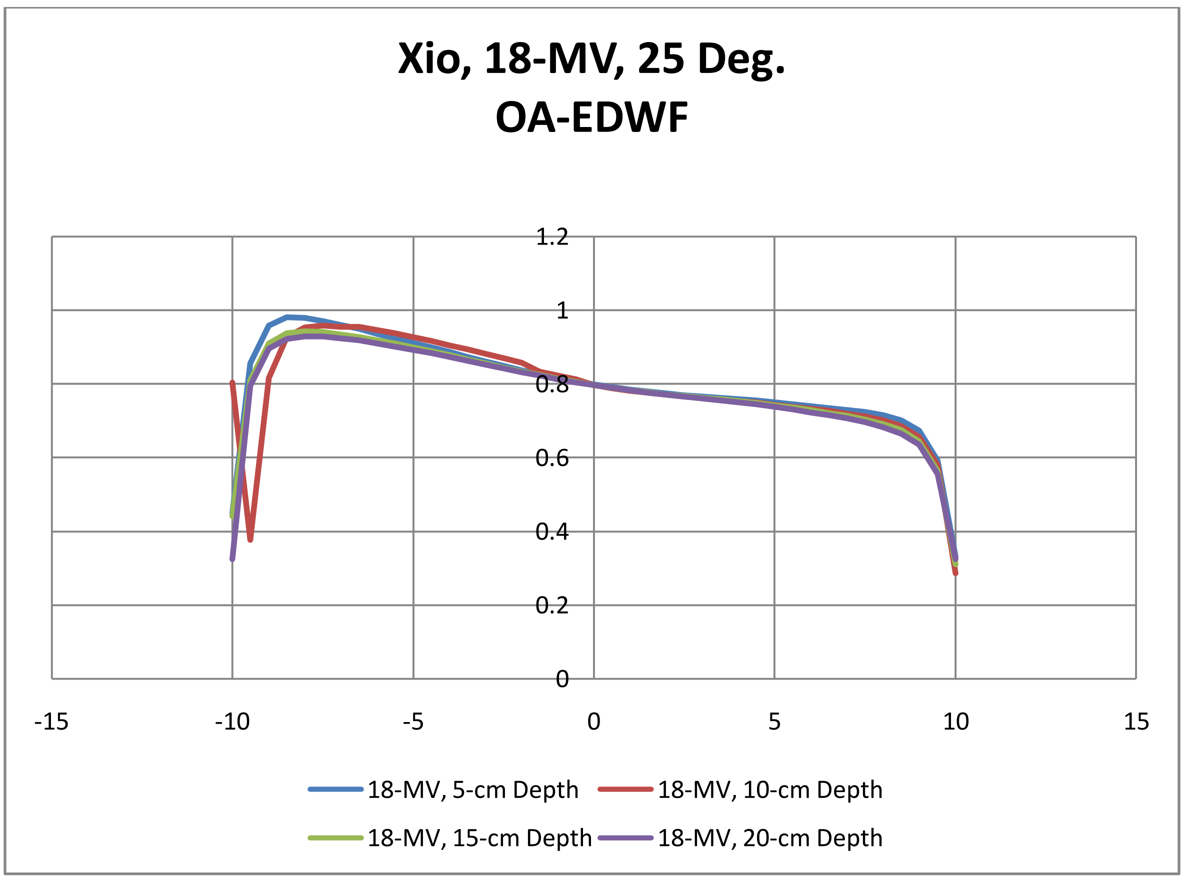
CMS Xio EDW Off-Axis Wedge Factors 6 MV at 10 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.6727	0.5578	0.5001	0.3329	0.1568	**10.0**
9.5	0.7114	0.5963	0.5349	0.3589	0.1739	**9.5**
9.0	0.7262	0.6109	0.5492	0.3722	0.1855	**9.0**
8.5	0.7368	0.6225	0.5608	0.3833	0.1968	**8.5**
8.0	0.7459	0.6320	0.5704	0.3938	0.2081	**8.0**
7.5	0.7541	0.6407	0.5799	0.4043	0.2193	**7.5**
7.0	0.7607	0.6494	0.5888	0.4148	0.2314	**7.0**
6.5	0.7673	0.6567	0.5970	0.4247	0.2431	**6.5**
6.0	0.7722	0.6640	0.6051	0.4347	0.2556	**6.0**
5.5	0.7780	0.6712	0.6126	0.4452	0.2685	**5.5**
5.0	0.7821	0.6785	0.6208	0.4557	0.2819	**5.0**
4.5	0.7870	0.6850	0.6283	0.4662	0.2956	**4.5**
4.0	0.7911	0.6923	0.6365	0.4773	0.3102	**4.0**
3.5	0.7952	0.6989	0.6440	0.4889	0.3248	**3.5**
3.0	0.7993	0.7054	0.6529	0.5005	0.3402	**3.0**
2.5	0.8043	0.7134	0.6611	0.5127	0.3565	**2.5**
2.0	0.8084	0.7199	0.6700	0.5254	0.3732	**2.0**
1.5	0.8125	0.7272	0.6788	0.5381	0.3903	**1.5**
1.0	0.8166	0.7352	0.6877	0.5520	0.4082	**1.0**
0.5	0.8224	0.7454	0.6993	0.5669	0.4278	**0.5**
0.0	0.8364	0.7650	0.7225	0.5990	0.4691	**0.0**
-0.5	0.8438	0.7767	0.7334	0.6167	0.4920	**-0.5**
-1.0	0.8520	0.7883	0.7491	0.6355	0.5158	**-1.0**
-1.5	0.8676	0.8130	0.7771	0.6742	0.5658	**-1.5**
-2.0	0.8758	0.8254	0.7914	0.6946	0.5925	**-2.0**
-2.5	0.8832	0.8385	0.8064	0.7157	0.6196	**-2.5**
-3.0	0.8915	0.8516	0.8214	0.7372	0.6479	**-3.0**
-3.5	0.8964	0.8647	0.8371	0.7593	0.6767	**-3.5**
-4.0	0.8997	0.8778	0.8528	0.7820	0.7072	**-4.0**
-4.5	0.9071	0.8879	0.8685	0.8047	0.7372	**-4.5**
-5.0	0.9145	0.8908	0.8835	0.8274	0.7676	**-5.0**
-5.5	0.9219	0.9032	0.8849	0.8495	0.7981	**-5.5**
-6.0	0.9276	0.9148	0.8978	0.8716	0.8285	**-6.0**
-6.5	0.9318	0.9258	0.9115	0.8716	0.8285	**-6.5**
-7.0	0.9318	0.9258	0.9115	0.8771	0.8585	**-7.0**
-7.5	0.9326	0.9352	0.9237	0.8921	0.8685	**-7.5**
-8.0	0.9350	0.9418	0.9340	0.9114	0.8864	**-8.0**
-8.5	0.9367	0.9425	0.9367	0.9225	0.9069	**-8.5**
-9.0	0.8780	0.8182	0.8162	0.8115	0.8057	**-9.0**
-9.5	0.8290	0.7541	0.7095	0.5818	0.4478	**-9.5**
-10.0	0.8594	0.8007	0.7627	0.6543	0.5404	**-10.0**

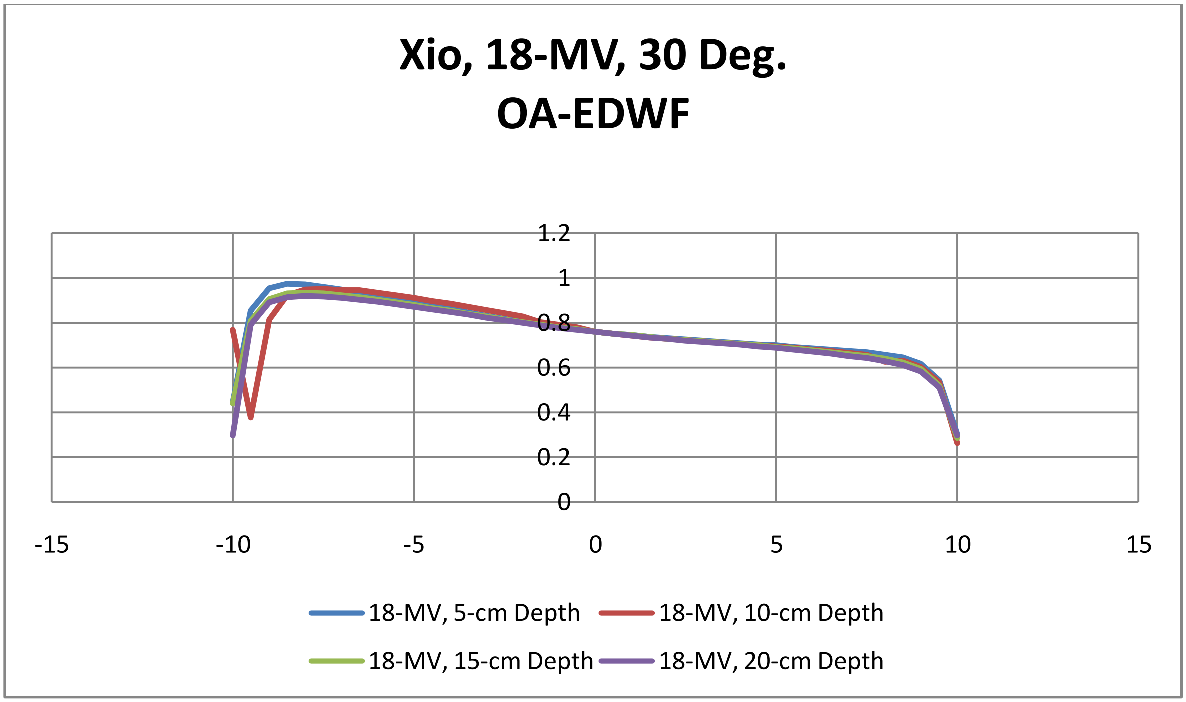
CMS Xio EDW Off-Axis Wedge Factors
6 MV at 15 cm Depth

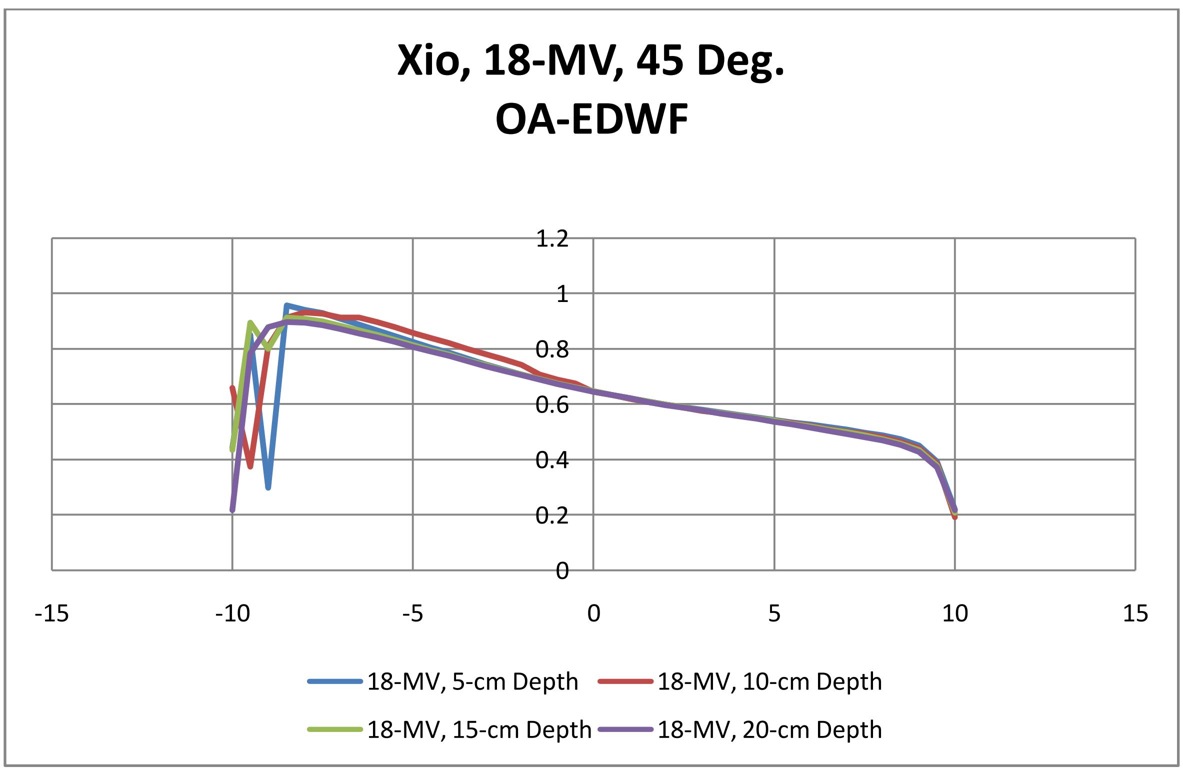
Distance(cm)	15	25	30	45	60	Distance(cm)
10.0	0.3701	0.3032	0.2723	0.1830	0.0892	**10.0**
9.5	0.6365	0.5213	0.4675	0.3123	0.1501	**9.5**
9.0	0.6891	0.5664	0.5084	0.3422	0.1685	**9.0**
8.5	0.7072	0.5823	0.5241	0.3560	0.1801	**8.5**
8.0	0.7196	0.5947	0.5364	0.3676	0.1910	**8.0**
7.5	0.7311	0.6063	0.5480	0.3792	0.2022	**7.5**
7.0	0.7409	0.6165	0.5582	0.3903	0.2139	**7.0**
6.5	0.7500	0.6260	0.5678	0.4008	0.2256	**6.5**
6.0	0.7574	0.6347	0.5773	0.4113	0.2377	**6.0**
5.5	0.7640	0.6427	0.5862	0.4218	0.2498	**5.5**
5.0	0.7706	0.6507	0.5951	0.4323	0.2627	**5.0**
4.5	0.7771	0.6587	0.6033	0.4434	0.2756	**4.5**
4.0	0.7829	0.6660	0.6115	0.4544	0.2894	**4.0**
3.5	0.7878	0.6732	0.6203	0.4655	0.3032	**3.5**
3.0	0.7928	0.6805	0.6285	0.4765	0.3178	**3.0**
2.5	0.7977	0.6878	0.6367	0.4881	0.3328	**2.5**
2.0	0.8026	0.6950	0.6456	0.5003	0.3482	**2.0**
1.5	0.8067	0.7030	0.6538	0.5125	0.3645	**1.5**
1.0	0.8117	0.7103	0.6627	0.5252	0.3811	**1.0**
0.5	0.8166	0.7183	0.6722	0.5384	0.3987	**0.5**
0.0	0.8224	0.7270	0.6824	0.5528	0.4170	**0.0**
-0.5	0.8281	0.7365	0.6934	0.5677	0.4362	**-0.5**
-1.0	0.8347	0.7750	0.7043	0.5832	0.4566	**-1.0**
-1.5	0.8421	0.7568	0.7166	0.5998	0.4779	**-1.5**
-2.0	0.8495	0.7670	0.7288	0.6169	0.5000	**-2.0**
-2.5	0.8561	0.7779	0.7411	0.6346	0.5225	**-2.5**
-3.0	0.8635	0.7888	0.7541	0.6529	0.5463	**-3.0**
-3.5	0.8701	0.8005	0.7671	0.6711	0.5705	**-3.5**
-4.0	0.8766	0.8114	0.7807	0.6899	0.5955	**-4.0**
-4.5	0.8832	0.8223	0.7937	0.7093	0.6209	**-4.5**
-5.0	0.8898	0.8332	0.8066	0.7286	0.6468	**-5.0**
-5.5	0.8955	0.8441	0.8196	0.7485	0.6735	**-5.5**
-6.0	0.9005	0.8543	0.8326	0.7679	0.7002	**-6.0**
-6.5	0.9046	0.8637	0.8442	0.7867	0.7264	**-6.5**
-7.0	0.9079	0.8724	0.8558	0.8054	0.7527	**-7.0**
-7.5	0.9104	0.8804	0.8667	0.8237	0.7705	**-7.5**
-8.0	0.9071	0.8862	0.8742	0.8397	0.8036	**-8.0**
-8.5	0.9095	0.8899	0.8810	0.8546	0.8265	**-8.5**
-9.0	0.8980	0.8870	0.8810	0.8624	0.8428	**-9.0**
-9.5	0.8405	0.8332	0.8298	0.8176	0.8048	**-9.5**
-10.0	0.8400	0.8300	0.8290	0.8170	0.8040	**-10.0**

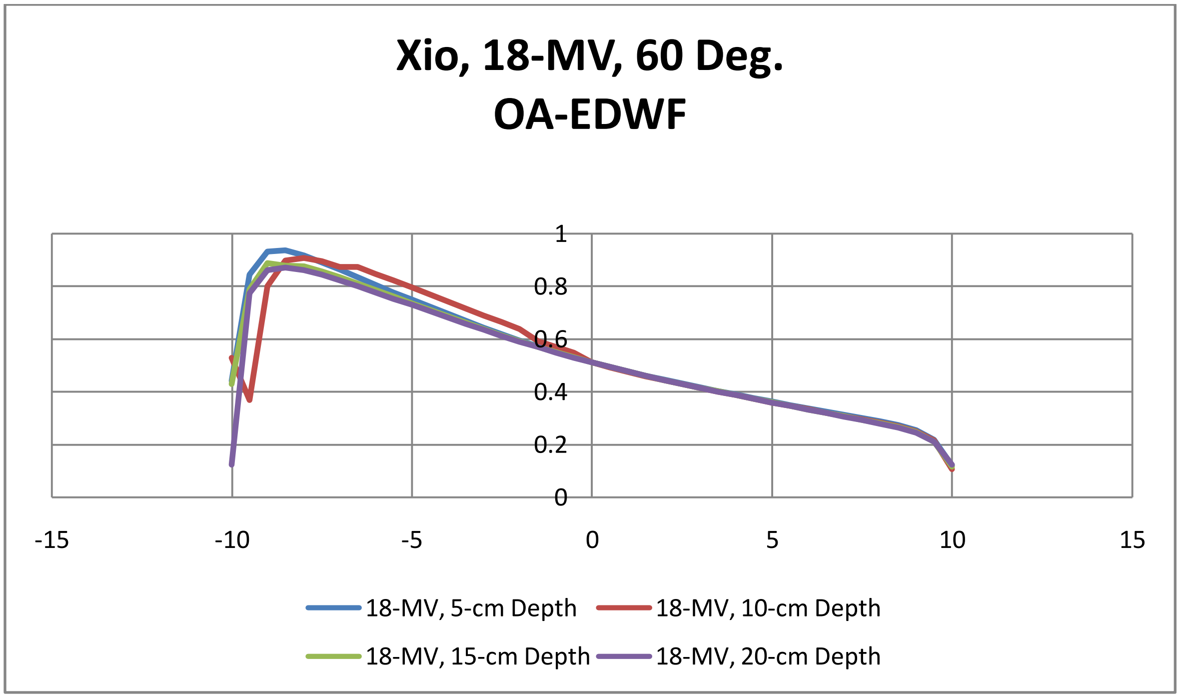
CMS Xio EDW Off-Axis Wedge Factors 6 MV at 20 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3833	0.3142	0.2823	0.1904	0.0941	**10.0**
9.5	0.6273	0.5136	0.4614	0.3094	0.1506	**9.5**
9.0	0.6793	0.5572	0.5010	0.3382	0.1682	**9.0**
8.5	0.6974	0.5739	0.5174	0.3520	0.1799	**8.5**
8.0	0.7114	0.5870	0.5304	0.3642	0.1912	**8.0**
7.5	0.7238	0.5994	0.5420	0.3758	0.2029	**7.5**
7.0	0.7345	0.6096	0.5530	0.3874	0.2142	**7.0**
6.5	0.7436	0.6198	0.5639	0.3985	0.2264	**6.5**
6.0	0.7526	0.6299	0.5735	0.4095	0.2385	**6.0**
5.5	0.7601	0.6387	0.5830	0.4206	0.2510	**5.5**
5.0	0.7675	0.6474	0.5926	0.4317	0.2636	**5.0**
4.5	0.7749	0.6561	0.6015	0.4428	0.2770	**4.5**
4.0	0.7815	0.6641	0.6104	0.4538	0.2908	**4.0**
3.5	0.7873	0.6721	0.6193	0.4654	0.3050	**3.5**
3.0	0.7922	0.6794	0.6281	0.4771	0.3192	**3.0**
2.5	0.7980	0.6874	0.6370	0.4887	0.3347	**2.5**
2.0	0.8037	0.6954	0.6459	0.5009	0.3502	**2.0**
1.5	0.8087	0.7027	0.6548	0.5130	0.3661	**1.5**
1.0	0.8136	0.7107	0.6637	0.5263	0.3828	**1.0**
0.5	0.8186	0.7187	0.6739	0.5396	0.4004	**0.5**
0.0	0.8244	0.7274	0.6835	0.5534	0.4184	**0.0**
-0.5	0.8301	0.7362	0.6938	0.5678	0.4368	**-0.5**
-1.0	0.8367	0.7456	0.7047	0.5833	0.4569	**-1.0**
-1.5	0.8433	0.7558	0.7163	0.5994	0.4778	**-1.5**
-2.0	0.8499	0.7660	0.7286	0.6160	0.4991	**-2.0**
-2.5	0.8557	0.7762	0.7402	0.6326	0.5213	**-2.5**
-3.0	0.8623	0.7863	0.7519	0.6497	0.5439	**-3.0**
-3.5	0.8689	0.7965	0.7642	0.6674	0.5673	**-3.5**
-4.0	0.8738	0.8067	0.7765	0.6852	0.5912	**-4.0**
-4.5	0.8796	0.8169	0.7888	0.7034	0.6155	**-4.5**
-5.0	0.8829	0.8264	0.8004	0.7211	0.6397	**-5.0**
-5.5	0.8845	0.8358	0.8120	0.7394	0.6648	**-5.5**
-6.0	0.8895	0.8453	0.8236	0.7577	0.6903	**-6.0**
-6.5	0.8936	0.8525	0.8339	0.7748	0.7146	**-6.5**
-7.0	0.8936	0.8598	0.8435	0.7920	0.7393	**-7.0**
-7.5	0.8961	0.8664	0.8523	0.8086	0.7636	**-7.5**
-8.0	0.8969	0.8685	0.8592	0.8230	0.7862	**-8.0**
-8.5	0.8977	0.8700	0.8633	0.8362	0.8075	**-8.5**
-9.0	0.8977	0.8729	0.8646	0.8423	0.8221	**-9.0**
-9.5	0.8260	0.8162	0.8127	0.7992	0.7857	**-9.5**
-10.0	0.3833	0.3142	0.2823	0.1904	0.0941	**-10.0**


Xio, 18-MV, 15 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth


Xio, 18-MV, 25 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth


Xio, 18-MV, 30 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth


Xio, 18-MV, 45 Deg.
OA-EDWF
1.2
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth



Xio, 18-MV, 60 Deg.
OA-EDWF
1
0.8
0.6
0.4
0.2
0
-15
-10
-5
0
5
10
15
18-MV, 5-cm Depth
18-MV, 10-cm Depth
18-MV, 15-cm Depth
18-MV, 20-cm Depth

CMS Xio EDW Off-Axis Wedge Factors 18 MV at 5 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3869	0.3309	0.3033	0.2192	0.1211	**10.0**
9.5	0.6932	0.5923	0.5433	0.3931	0.2192	**9.5**
9.0	0.7862	0.6730	0.6180	0.4500	0.2551	**9.0**
8.5	0.8169	0.7010	0.6454	0.4733	0.2741	**8.5**
8.0	0.8309	0.7146	0.6591	0.4875	0.2879	**8.0**
7.5	0.8379	0.7233	0.6683	0.4979	0.3008	**7.5**
7.0	0.8423	0.7297	0.6751	0.5076	0.3131	**7.0**
6.5	0.8458	0.7345	0.6812	0.5166	0.3249	**6.5**
6.0	0.8493	0.7401	0.6873	0.5257	0.3377	**6.0**
5.5	0.8520	0.7449	0.6934	0.5347	0.3500	**5.5**
5.0	0.8546	0.7497	0.6995	0.5438	0.3634	**5.0**
4.5	0.8572	0.7545	0.7049	0.5529	0.3767	**4.5**
4.0	0.8590	0.7585	0.7102	0.5619	0.3901	**4.0**
3.5	0.8599	0.7625	0.7155	0.5710	0.4034	**3.5**
3.0	0.8607	0.7657	0.7201	0.5800	0.4168	**3.0**
2.5	0.8616	0.7697	0.7254	0.5891	0.4311	**2.5**
2.0	0.8634	0.7745	0.7315	0.5994	0.4460	**2.0**
1.5	0.8660	0.7793	0.7376	0.6098	0.4614	**1.5**
1.0	0.8686	0.7849	0.7452	0.6214	0.4778	**1.0**
0.5	0.8721	0.7913	0.7529	0.6330	0.4948	**0.5**
0.0	0.8774	0.7993	0.7620	0.6466	0.5132	**0.0**
-0.5	0.8827	0.8073	0.7712	0.6602	0.5322	**-0.5**
-1.0	0.8888	0.8161	0.7818	0.6751	0.5523	**-1.0**
-1.5	0.8958	0.8265	0.7933	0.6912	0.5738	**-1.5**
-2.0	0.9029	0.8368	0.8054	0.7080	0.5959	**-2.0**
-2.5	0.9116	0.8488	0.8184	0.7261	0.6190	**-2.5**
-3.0	0.9204	0.8608	0.8329	0.7449	0.6441	**-3.0**
-3.5	0.9301	0.8744	0.8474	0.7649	0.6698	**-3.5**
-4.0	0.9397	0.8872	0.8626	0.7850	0.6960	**-4.0**
-4.5	0.9494	0.9000	0.8771	0.8050	0.7232	**-4.5**
-5.0	0.9573	0.9120	0.8916	0.8257	0.7499	**-5.0**
-5.5	0.9660	0.9248	0.9060	0.8458	0.7776	**-5.5**
-6.0	0.9739	0.9368	0.9197	0.8665	0.8058	**-6.0**
-6.5	0.9818	0.9495	0.9342	0.8878	0.8345	**-6.5**
-7.0	0.9888	0.9607	0.9487	0.9085	0.8633	**-7.0**
-7.5	0.9950	0.9719	0.9617	0.9285	0.8920	**-7.5**
-8.0	0.9985	0.9799	0.9723	0.9402	0.9182	**-8.0**
-8.5	0.9941	0.9815	0.9754	0.9570	0.9372	**-8.5**
-9.0	0.9678	0.9591	0.9556	0.2974	0.9326	**-9.0**
-9.5	0.8616	0.8568	0.8550	0.8496	0.8438	**-9.5**
-10.0	0.4501	0.4484	0.4473	0.4442	0.4419	**-10.0**

CMS Xio EDW Off-Axis Wedge Factors 18 MV at 10 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3634	0.2867	0.2624	0.1909	0.1059	**10.0**
9.5	0.6893	0.5804	0.5323	0.3862	0.2143	**9.5**
9.0	0.7688	0.6561	0.6022	0.4400	0.2488	**9.0**
8.5	0.7120	0.6858	0.6304	0.4640	0.2678	**8.5**
8.0	0.8151	0.7015	0.6237	0.4792	0.2823	**8.0**
7.5	0.8247	0.7124	0.6572	0.4912	0.2958	**7.5**
7.0	0.8308	0.7202	0.6653	0.5013	0.3083	**7.0**
6.5	0.8360	0.7272	0.6728	0.5114	0.3208	**6.5**
6.0	0.8404	0.7335	0.6802	0.5209	0.3337	**6.0**
5.5	0.8448	0.7389	0.6869	0.5310	0.3467	**5.5**
5.0	0.8482	0.7444	0.6936	0.5405	0.3597	**5.0**
4.5	0.8509	0.7499	0.6995	0.5500	0.3732	**4.5**
4.0	0.8535	0.7546	0.7055	0.5595	0.3867	**4.0**
3.5	0.8544	0.7585	0.7107	0.5683	0.4002	**3.5**
3.0	0.8561	0.7624	0.7159	0.5759	0.4142	**3.0**
2.5	0.8570	0.7663	0.7211	0.5873	0.4282	**2.5**
2.0	0.8596	0.7718	0.7278	0.5974	0.4432	**2.0**
1.5	0.8622	0.7764	0.7345	0.6081	0.4587	**1.5**
1.0	0.8648	0.7827	0.7412	0.6195	0.4751	**1.0**
0.5	0.8683	0.7889	0.7493	0.6322	0.4921	**0.5**
0.0	0.8736	0.7975	0.7590	0.6454	0.5106	**0.0**
-0.5	0.8841	0.8139	0.7783	0.6739	0.5491	**-0.5**
-1.0	0.8911	0.8233	0.7895	0.6897	0.5701	**-1.0**
-1.5	0.8989	0.8342	0.8014	0.7061	0.5921	**-1.5**
-2.0	0.9155	0.8577	0.8281	0.7422	0.6390	**-2.0**
-2.5	0.9242	0.8702	0.8423	0.7617	0.6645	**-2.5**
-3.0	0.9330	0.8827	0.8564	0.7813	0.6900	**-3.0**
-3.5	0.9408	0.8944	0.8698	0.8003	0.7160	**-3.5**
-4.0	0.9487	0.9061	0.8832	0.8199	0.7419	**-4.0**
-4.5	0.9557	0.9170	0.8965	0.8395	0.7684	**-4.5**
-5.0	0.9627	0.9280	0.9092	0.8585	0.7949	**-5.0**
-5.5	0.9688	0.9381	0.9218	0.8774	0.8219	**-5.5**
-6.0	0.9740	0.9475	0.9337	0.8964	0.8479	**-6.0**
-6.5	0.9775	0.9553	0.9434	0.9135	0.8728	**-6.5**
-7.0	0.9775	0.9553	0.9434	0.9135	0.8728	**-7.0**
-7.5	0.9767	0.9592	0.9501	0.9267	0.8948	**-7.5**
-8.0	0.9697	0.9545	0.9478	0.9318	0.9078	**-8.0**
-8.5	0.9426	0.9272	0.9218	0.9128	0.8973	**-8.5**
-9.0	0.8552	0.8171	0.8140	0.8098	0.8004	**-9.0**
-9.5	0.4412	0.3773	0.3754	0.3730	0.3682	**-9.5**
-10.0	0.8788	0.8046	0.7679	0.6587	0.5291	**-10.0**

CMS Xio EDW Off-Axis Wedge Factors 18 MV at 15 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3616	0.3102	0.2847	0.2074	0.1168	**10.0**
9.5	0.6594	0.5646	0.5191	0.3773	0.2116	**9.5**
9.0	0.7494	0.6436	0.5929	0.4329	0.2470	**9.0**
8.5	0.7843	0.6747	0.6226	0.4575	0.2664	**8.5**
8.0	0.8009	0.6914	0.6386	0.4736	0.2813	**8.0**
7.5	0.8132	0.7034	0.6515	0.4865	0.2951	**7.5**
7.0	0.8210	0.7129	0.6607	0.4975	0.3085	**7.0**
6.5	0.8280	0.7209	0.6698	0.5085	0.3213	**6.5**
6.0	0.8332	0.7281	0.6774	0.5188	0.3341	**6.0**
5.5	0.8385	0.7353	0.6850	0.5292	0.3474	**5.5**
5.0	0.8428	0.7416	0.6926	0.5395	0.3612	**5.0**
4.5	0.8472	0.7472	0.6995	0.5492	0.3746	**4.5**
4.0	0.8498	0.7528	0.7063	0.5589	0.3884	**4.0**
3.5	0.8525	0.7576	0.7117	0.5686	0.4022	**3.5**
3.0	0.8542	0.7616	0.7178	0.5783	0.4161	**3.0**
2.5	0.8559	0.7664	0.7231	0.5880	0.4304	**2.5**
2.0	0.8586	0.7712	0.7299	0.5983	0.4453	**2.0**
1.5	0.8612	0.7767	0.7368	0.6093	0.4611	**1.5**
1.0	0.8647	0.7831	0.7444	0.6209	0.4775	**1.0**
0.5	0.8682	0.7895	0.7520	0.6332	0.4944	**0.5**
0.0	0.8734	0.7975	0.7611	0.6461	0.5124	**0.0**
-0.5	0.8787	0.8054	0.7703	0.6597	0.5308	**-0.5**
-1.0	0.8839	0.8142	0.7802	0.6739	0.5503	**-1.0**
-1.5	0.8909	0.8238	0.7916	0.6894	0.5713	**-1.5**
-2.0	0.8970	0.8334	0.8030	0.7056	0.5923	**-2.0**
-2.5	0.9049	0.8437	0.8152	0.7224	0.6149	**-2.5**
-3.0	0.9127	0.8549	0.8281	0.7405	0.6384	**-3.0**
-3.5	0.9206	0.8668	0.8411	0.7585	0.6625	**-3.5**
-4.0	0.9284	0.8780	0.8540	0.7773	0.6876	**-4.0**
-4.5	0.9363	0.8892	0.8669	0.7954	0.7122	**-4.5**
-5.0	0.9424	0.8995	0.8791	0.8135	0.7368	**-5.0**
-5.5	0.9485	0.9091	0.8913	0.8316	0.7619	**-5.5**
-6.0	0.9538	0.9187	0.9027	0.8490	0.7870	**-6.0**
-6.5	0.9573	0.9275	0.9134	0.8664	0.8111	**-6.5**
-7.0	0.9608	0.9346	0.9225	0.8826	0.8352	**-7.0**
-7.5	0.9616	0.9402	0.9309	0.8975	0.8582	**-7.5**
-8.0	0.9590	0.9426	0.9347	0.9084	0.8772	**-8.0**
-8.5	0.9494	0.9370	0.9316	0.9123	0.8782	**-8.5**
-9.0	0.9171	0.9091	0.9065	0.7999	0.8890	**-9.0**
-9.5	0.8132	0.8086	0.8076	0.8936	0.7906	**-9.5**
-10.0	0.4428	0.4402	0.4392	0.4348	0.4294	**-10.0**

CMS Xio EDW Off-Axis Wedge Factors 18 MV at 20 cm Depth						
Distance(cm)	**15**	**25**	**30**	**45**	**60**	**Distance(cm)**
10.0	0.3793	0.3245	0.2986	0.2171	0.1227	**10.0**
9.5	0.6503	0.5566	0.5113	0.3721	0.2097	**9.5**
9.0	0.7411	0.6363	0.5850	0.4283	0.2450	**9.0**
8.5	0.7744	0.6658	0.6131	0.4523	0.2639	**8.5**
8.0	0.7918	0.6834	0.6298	0.4684	0.2787	**8.0**
7.5	0.8041	0.6961	0.6435	0.4820	0.2925	**7.5**
7.0	0.8137	0.7065	0.6534	0.4936	0.3058	**7.0**
6.5	0.8216	0.7153	0.6632	0.5046	0.3191	**6.5**
6.0	0.8285	0.7232	0.6724	0.5156	0.3324	**6.0**
5.5	0.8338	0.7312	0.6800	0.5266	0.3457	**5.5**
5.0	0.8390	0.7376	0.6883	0.5369	0.3595	**5.0**
4.5	0.8443	0.7448	0.6959	0.5479	0.3733	**4.5**
4.0	0.8478	0.7504	0.7027	0.5576	0.3872	**4.0**
3.5	0.8504	0.7551	0.7088	0.5673	0.4010	**3.5**
3.0	0.8530	0.7607	0.7149	0.5769	0.4148	**3.0**
2.5	0.8556	0.7655	0.7210	0.5873	0.4296	**2.5**
2.0	0.8583	0.7711	0.7278	0.5976	0.4444	**2.0**
1.5	0.8618	0.7767	0.7354	0.6093	0.4603	**1.5**
1.0	0.8653	0.7831	0.7423	0.6209	0.4766	**1.0**
0.5	0.8696	0.7902	0.7514	0.6332	0.4940	**0.5**
0.0	0.8740	0.7974	0.7597	0.6461	0.5114	**0.0**
-0.5	0.8784	0.8046	0.7688	0.6590	0.5293	**-0.5**
-1.0	0.8845	0.8134	0.7787	0.6739	0.5488	**-1.0**
-1.5	0.8906	0.8229	0.7894	0.6887	0.5692	**-1.5**
-2.0	0.8967	0.8325	0.8000	0.7042	0.5902	**-2.0**
-2.5	0.9037	0.8421	0.8121	0.7210	0.6122	**-2.5**
-3.0	0.9116	0.8532	0.8243	0.7378	0.6352	**-3.0**
-3.5	0.9186	0.8644	0.8372	0.7559	0.6587	**-3.5**
-4.0	0.9264	0.8748	0.8494	0.7740	0.6822	**-4.0**
-4.5	0.9326	0.8851	0.8615	0.7908	0.7063	**-4.5**
-5.0	0.9378	0.8939	0.8722	0.8082	0.7298	**-5.0**
-5.5	0.9430	0.9027	0.8828	0.8250	0.7533	**-5.5**
-6.0	0.9474	0.9114	0.8934	0.8412	0.7774	**-6.0**
-6.5	0.9500	0.9186	0.9026	0.8567	0.8004	**-6.5**
-7.0	0.9518	0.9250	0.9109	0.8722	0.8229	**-7.0**
-7.5	0.9518	0.9290	0.9178	0.8851	0.8439	**-7.5**
-8.0	0.9474	0.9298	0.9200	0.8948	0.8612	**-8.0**
-8.5	0.9361	0.9226	0.9155	0.8974	0.8715	**-8.5**
-9.0	0.9063	0.8971	0.8927	0.8800	0.8623	**-9.0**
-9.5	0.8006	0.7950	0.7924	0.7850	0.7738	**-9.5**
-10.0	0.3793	0.3245	0.2986	0.2171	0.1227	**-10.0**

APPENDIX D

6-MV 15-Degree EDW Percent Difference of TPS vs. Actual				
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-2	103.60%	434.76%	0.19%	205.59%
2 cm	7.45%	26.08%	2.51%	27.41%
	-4.22%	2.53%	-3.50%	6.76%
	-5.75%	-0.96%	-4.35%	2.83%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	2.51%	4.07%	2.90%	3.63%
2 cm	2.69%	-0.51%	4.71%	7.32%
	177.29%	100.49%	131.10%	123.33%
	153.69%	189.39%	264.78%	61.46%

6-MV 25-Degree EDW Percent Difference of TPS vs. Actual				
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-2	142.91%	322.43%	130.85%	156.07%
2 cm	10.89%	29.70%	20.17%	27.86%
	-2.04%	6.76%	2.76%	7.66%
	-3.46%	3.55%	-0.31%	4.21%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	8.06%	9.87%	9.38%	6.19%
2 cm	8.42%	-3.70%	8.85%	9.00%
	141.46%	97.65%	3.29%	112.49%
	84.36%	201.08%	2.62%	18.33%

6-MV 30-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	111.60%	274.22%	110.16%	132.26%
2 cm	9.50%	28.83%	21.57%	26.24%
	-1.99%	7.26%	4.92%	7.78%
	-3.15%	4.42%	2.24%	4.50%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	11.48%	13.16%	9.18%	8.82%
2 cm	11.74%	-0.90%	10.43%	10.92%
	135.77%	83.19%	113.66%	108.34%
	73.75%	173.33%	198.20%	0.49%

6-MV 45-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	-32.76%	135.54%	36.83%	48.01%
2 cm	9.43%	23.07%	14.72%	19.17%
	18.74%	6.02%	2.79%	5.10%
	18.42%	4.28%	1.54%	3.18%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	25.79%	27.69%	20.81%	19.88%
2 cm	25.68%	11.35%	21.54%	21.05%
	136.27%	51.19%	112.29%	107.26%
	60.56%	118.24%	173.97%	-36.42%

6-MV 60-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	-40.37%	9.35%	-34.16%	-36.81%
2 cm	-16.52%	-0.07%	-9.19%	-17.89%
	-15.91%	-5.35%	-10.97%	-21.15%
	-13.86%	-3.90%	-9.15%	-19.81%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	53.01%	55.42%	44.01%	83.74%
2 cm	52.84%	35.36%	44.56%	93.80%
	162.38%	29.67%	132.02%	319.39%
	69.40%	90.19%	182.66%	-21.69%

18-MV 15-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	160.51%	-52.53%	-51.62%	159.45%
2 cm	-9.51%	-10.52%	-12.63%	-2.61%
	-4.46%	-0.77%	-1.61%	0.30%
	-1.87%	-8.43%	2.33%	1.68%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	2.29%	-1.31%	4.89%	0.50%
2 cm	1.36%	-8.18%	1.21%	0.50%
	124.13%	12.47%	-10.30%	98.57%
	132.68%	351.52%	-51.11%	92.78%

18-MV 25-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	116.13%	90.59%	109.46%	124.02%
2 cm	-7.64%	-4.34%	-2.97%	-0.78%
	-2.18%	-0.81%	0.83%	2.68%
	0.49%	1.49%	2.76%	4.03%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	5.51%	1.11%	3.61%	3.14%
2 cm	4.03%	-9.43%	2.52%	2.57%
	108.22%	-9.59%	91.39%	86.50%
	87.26%	236.42%	82.39%	34.26%

18-MV 30-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	95.27%	72.35%	89.77%	105.15%
2 cm	-6.71%	-3.90%	-2.20%	-0.10%
	-1.06%	-0.06%	1.79%	3.61%
	1.81%	2.25%	3.77%	4.95%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	7.69%	3.10%	5.28%	4.76%
2 cm	5.94%	-7.90%	4.07%	4.04%
	104.19%	-11.91%	87.04%	82.30%
	74.20%	198.00%	68.83%	14.77%

18-MV 45-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	37.40%	22.92%	36.74%	44.64%
2 cm	-5.05%	-2.09%	-0.68%	0.69%
	1.51%	2.79%	4.32%	5.61%
	4.40%	5.35%	6.53%	7.39%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	16.89%	12.53%	13.46%	12.59%
2 cm	-63.88%	-0.24%	-0.19%	11.01%
	98.07%	-13.84%	104.50%	77.82%
	49.79%	124.19%	47.41%	-26.66%

18-MV 60-Degree EDW Percent Difference of TPS vs. Actual

Depth	5 cm	10 cm	15cm	20 cm
Last y-2	-25.79%	-32.74%	-24.03%	-18.36%
2 cm	-8.46%	-6.75%	-5.66%	-3.92%
	-0.11%	0.48%	1.89%	3.49%
	3.24%	3.72%	5.28%	6.32%
Depth	**5 cm**	**10 cm**	**15cm**	**20 cm**
Last y-1	35.18%	30.46%	28.22%	28.14%
2 cm	32.21%	15.09%	28.76%	25.95%
	107.78%	-9.93%	91.79%	86.24%
	44.80%	74.50%	41.37%	-59.57%

APPENDIX E